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Geoscientific Employment and Hiring Survey

1988

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Introduction

The *Geoscientific Employment and Hiring Survey --1988* represents the second phase of AGI's ongoing program to examine and assess the need for and availability of geoscientists in a wide range of fields. This survey was developed from the first phase of the AGI project, the *1986 AGI North American Survey of Geoscientists*--a major study that defined the professional and demographic characteristics of geoscientists in the United States and Canada. AGI plans to repeat that survey every 4 to 5 years.

The hiring survey reports the results of a questionnaire sent in October 1987 to 274 companies, agencies, and universities representing the six major categories of geoscientific employers: domestic oil/gas industry, domestic mining/minerals industry, federal/state government agencies, DOE-funded national laboratories, geoscientific consulting firms, and academia. There were 147 anonymous returns for an excellent response rate of 53.7%.

The *Geoscientific Employment and Hiring Survey -- 1988* is a "first" in at least two respects: it is to be the first in an ongoing and annually updated survey of current employment levels and projected hiring plans for these six major categories of geoscientific employers; it is also the first such survey to target specifically the geoscience community.

For each employer category, this report presents the sampled and projected current employment levels (as of 12/31/87). Next, the sampled and projected hiring figures for each employer category are presented and briefly analyzed. Completing each employer section are the approximate starting salaries for inexperienced new hires by degree level. Summary tables at the end of the report and detailed tables of sampled and projected figures in the Appendix conclude the report.

The American Geological Institute gratefully acknowledges the following, without whose cooperation this survey would have been impossible:

- participating employers, whose generous and detailed data are the basis of the survey;
- members of the AGI Manpower Advisory Committee, whose diligence and leadership brought the project to fruition;
- AGI's Member Societies, whose constructive suggestions improved the final report.

AGI welcomes comments and suggestions on this program from all concerned geoscientists.

Employment and Hiring Survey for 1988

I. Survey Description

In October 1987, under the auspices and survey design of its Manpower Advisory Committee, the American Geological Institute (AGI) sent out survey questionnaires to assess the current employment levels and anticipated hiring plans of six major categories of geoscientific employers:

- domestic oil and gas industry
- domestic mining/minerals industry
- federal and state government agencies
- DOE-funded national laboratories
- geoscientific consulting firms
- academia

The questionnaires requested information on current employment levels, the number of inexperienced new hires anticipated to be hired in 1988, the approximate starting salaries for new hires by degree level, the number of experienced personnel anticipated to be hired in 1988, and the number of personnel expected to be lost in 1988. All survey responses were returned anonymously.

The survey sample was developed by the Manpower Advisory Committee whose members include representatives of most of the major employer groups. Table 1 below shows the response rate for each employer category:

Table 1

Summary of Responses to Questionnaire by Employer Category

EMPLOYER CATEGORY	Number Mailed	Number of Responses	Response Rate (%)
Domestic Oil and Gas Industry	31	15	48.4
Domestic Mining/Minerals Industry	30	12	40.0
Federal/State Government Agencies	43	27	62.8
DOE-funded National Laboratories	5	3	60.0
Geoscientific Consulting Firms	49	10	20.4
Academia	116	80	69.0
TOTAL	**274**	**147**	**53.7**

II. Analysis of Survey Results

A. Percentage of Employees Reported - Total

Each responding employer provided the number of full-time current employees on their respective staffs. The number of personnel reported was compared to the estimated total number of employees in each employer category established in the AGI *1986 North American Survey of Geoscientists, U.S. Section.* The number of employees reported in the survey and their respective percentages compared to the whole population are shown in Table 2:

Table 2

Number and Percentage of Total Employees

	Number Reported Employed in Sample (12/31/87)	Total Number in Population[1]	% of Employment Reported in Survey[2]
EMPLOYER CATEGORY			
Domestic Oil and Gas Industry	10,498	38,500[3]	27.3
Domestic Mining/Minerals Industry	453	11,000	4.1
Federal/State Government Agencies	5,843	14,000	41.7
DOE-funded National Laboratories	275	3,000	9.2
Geoscientific Consulting Firms	1,074	8,000	13.4
Academia	977	9,000	10.9
TOTAL	**19,120**	**83,500**	**22.9**

1 From *1986 AGI North American Survey of Geoscientists, U.S. Section.*

2 The percentages of employees reported in the survey will be used to determine all projections in the following analysis.

3 While the total number in the population working for the domestic oil and gas industry is estimated at 60,000, data from the American Association of Petroleum Geologists indicate that 64.1% of that association's membership work for integrated and independent petroleum companies. The total population is here refigured as 64.1% of 60,000, or 38,460 (rounded to 38,500).

B. Results for Each Employer Category

For each employer category, highlights of the results will be presented. Complete details can be found in the appropriate tables in the Appendix.

Table 3 presents a summary of projected hiring for 1988 by occupational categories and geoscientific employers:

Table 3

Summary of Projected Hiring Levels by Occupational Categories and Geoscientific Employers

	Oil/Gas Industry	Mining/ Minerals Industry[1]	Federal/ State Govts[2]	DOE-funded Nat'l Labs[3]	Geoscientific Consulting Firms[4]	Academia	TOTAL
Geologists	408	804	227	33	686	494	2,652
Geophysicists	340	24	62	33	82	155	696
Engineering Geologists	0	0	0	44	732	36	812
Hydrologists/ Hydrogeologists	0	0	426	44	806	109	1,385
Related Professional Scientists	93	0	244	22	157	0	516
TOTAL	**841**	**828**	**959**	**176**	**2,463**	**794**	**6,061**
% Increase over Current Employment Levels	2.2	7.5	6.9	5.9	30.8	8.8	7.3
% of Total Hiring	13.9	13.7	15.8	2.9	40.6	13.1	100.0

1 Since the time of the survey mailing, several questions have arisen concerning the percentages of employment reported for some of the employer groups. Those percentages affect the hiring projections made in this report. What follows are adjustments that should be considered when evaluating the hiring projections.

There is every indication that for the mining/minerals industry, the companies surveyed represent nearly 10% of the projected hiring levels, although they account for only 4.1% of those currently employed. Projections reported here are roughly twice the number of new jobs actually available.

2 At the time of the survey, federal/state government agencies reported on their current employment levels and hiring projections prior to final provisions of the FY 1988 budget. According to Penelope Hanshaw, Deputy Chief Geologist, U.S. Geological Survey, Reston, VA, "...both budget and staff ceiling reductions are expected for FY 1988 and are projected for the next several fiscal years. The Department of the Interior is under a total hiring freeze of indefinite duration." (From "Future Employment Opportunities in the Geological Sciences," a review of presentations made at the Geological Society of America's annual meeting, Phoenix, AZ, October, 1987.) Figures concerning federal hiring of geoscientists should be interpreted accordingly.

3 For similar reasons, projected hiring for DOE-funded national laboratories may be off by a factor of 50%. However, the Department of Energy is not one of those federal agencies specifically under budget and staff reduction constraints. The projections developed in this report should be interpreted with federal funding vagaries in mind.

4 While projections for geoscientific consulting firms seem relatively large, it is likely that federal agencies will have to increase their contracts with the private sector (e.g., geoscientific consulting firms). The reduction in federal hiring may be reflected in greater hiring levels for geoscientific consulting firms.

1. Domestic Oil and Gas Industry

(Appendix, Tables I.1 - 7)

a. Current Employment Levels

Respondents in this category indicated if they were an integrated petroleum company or an independent E&P company. There were 8 integrated petroleum companies responding and 7 independent E&P companies. Table 4 shows the sampled and projected employment levels by occupational objective for each type of company.

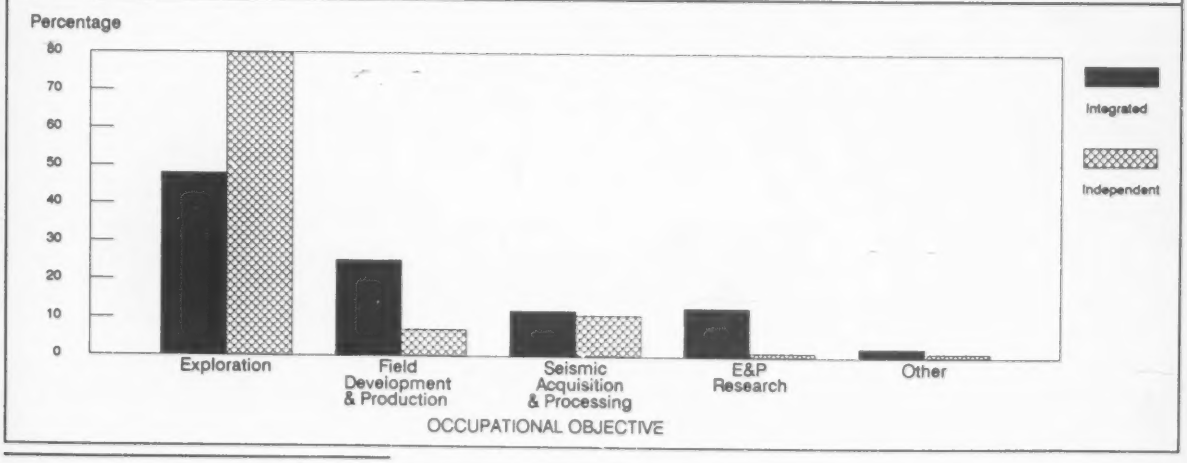
Table 4

Current Employment Levels and Occupational Objectives
Domestic Oil and Gas Industry
Sample and Projected[1]

	Integrated			Independent			TOTAL		
	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%
(% of total)			46.0			54.0			100.0
Exploration	2,310	8,461	47.9	4,523	16,568	79.8	6,833	25,029	65.1
Field Development and Production	1,208	4,425	25.0	397	1,454	7.0	1,605	5,879	15.3
Seismic Acquisition and Processing	581	2,128	12.0	618	2,264	10.9	1,199	4,392	11.4
E&P Research	619	2,267	12.8	66	242	1.2	685	2,509	6.5
Other	110	403	2.3	66	242	1.2	176	645	1.7
TOTAL	**4,828**	**17,684**	**100.0**	**5,670**	**20,770**	**100.1[2]**	**10,498**	**38,454**	**100.0**

Of those geoscientists employed in the domestic oil and gas industry, 46% work for integrated oil and gas companies. Figure A compares the percentages of current employment levels and occupational objectives for integrated and independent petroleum companies.

Figure A
Current Employment Levels and Occupational Objectives
Domestic Oil and Gas Industry



1 "Sample" refers to the number reported in this survey sample. "Projected" refers to employer-wide totals based on the proportionate samples developed in the *1986 AGI North American Survey of Geoscientists, U.S. Section.*

2 Totals do not always sum to 100.0% due to rounding.

Exploration is the occupational focus of 47.9% of those employed by integrated oil and gas companies and 79.8% of those working for independent oil and gas companies. Among other occupational objectives, roughly the same percentages from integrated and independent oil and gas companies work in seismic acquisition and processing.

Within the integrated oil and gas companies, the current and projected employment levels are shown in Table 5:

Table 5

Current Employment Levels by Occupational Objectives and Occupational Categories
Integrated Oil and Gas Companies

	Geologists[1]			Geophysicists			Related Professional Scientists[2]			TOTAL		
	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%
(% of total)			50.4			37.1			12.5			100.0
Exploration	1,233	4,517	50.7	1,039	3,806	58.0	38	139	6.3	2,310	8,462	47.8
Field Development and Production	1,008	3,692	41.4	142	520	7.9	58	213	9.6	1,208	4,425	25.0
Seismic Acquisition and Processing	15	55	0.6	331	1,213	18.5	235	861	39.0	581	2,129	12.0
E&P Research	168	615	6.9	269	985	15.0	182	667	30.2	619	2,267	12.8
Other	10	37	0.4	10	37	0.6	90	330	14.9	110	404	2.3
TOTAL	**2,434**	**8,916**	**100.0**	**1,791**	**6,561**	**100.0**	**603**	**2,210**	**100.0**	**4,828**	**17,687**	**99.9**

Within the independent petroleum companies, the current and projected employment levels are shown in Table 6:

Table 6

Current Employment Levels by Occupational Objectives and Occupational Categories
Independent Oil and Gas Companies

	Geologists			Geophysicists			Related Professional Scientists			TOTAL		
	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%
(% of total)			59.2			36.9			3.9			100.0
Exploration	2,957	10,832	88.1	1,431	5,242	68.4	133	487	60.2	4,521	16,561	79.7
Field Development and Production	353	1,293	10.5	44	161	2.1	0	0	0.0	397	1,454	7.0
Seismic Acquisition and Processing	0	0	0.0	617	2,260	29.5	0	0	0.0	617	2,260	10.9
E&P Research	47	172	1.4	0	0	0.0	22	81	10.2	69	253	1.2
Other	0	0	0.0	0	0	0.0	66	242	29.7	66	242	1.2
TOTAL	**3,357**	**12,297**	**100.0**	**2,092**	**7,663**	**100.0**	**221**	**810**	**100.1**	**257**	**20,770**	**100.0**

1 Includes geochemists.

2 E.g., computer scientists processing geoscientific data bases, chemists in geochemistry laboratories.

Domestic Oil and Gas Industry

The total percentages for geologists, geophysicists, and related professional scientists vary for the integrated and independent petroleum companies, as do the percentages for each occupational objective. Table 7 compares the percentages for integrated and independent petroleum companies by occupational category and occupational objective:

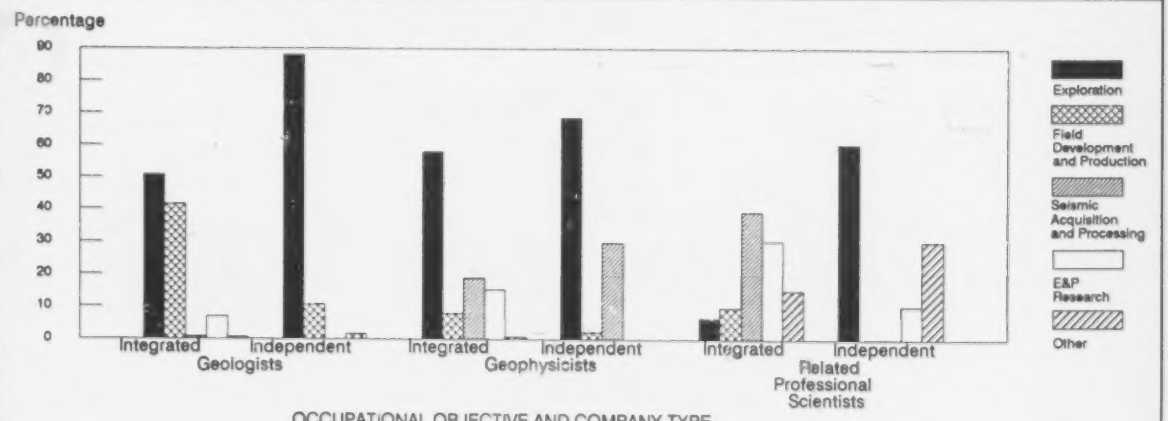
Table 7

Comparison of Current Employment Levels by Occupational Objectives and Occupational Categories
Integrated and Independent Oil and Gas Companies
(in percentages for each occupational category)

	Geologists		Geophysicists		Related Professional Scientists		TOTAL	
	Integrated	Independent	Integrated	Independent	Integrated	Independent	Integrated	Independent
Exploration	50.7	88.1	58.0	68.4	6.3	60.1	47.8	79.7
Field Development and Production	41.4	10.5	7.9	2.1	9.6	0.0	25.0	7.0
Seismic Acquisition and Processing	0.6	0.0	18.5	29.5	39.0	0.0	12.0	10.9
E&P Research	6.9	1.4	15.0	0.0	30.2	10.0	12.8	1.2
Other	0.4	0.0	0.6	0.0	14.9	29.9	2.3	1.2
TOTAL	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**99.9**	**100.0**

Figure B compares integrated and independent petroleum companies by occupational objectives and occupational categories:

Figure B
Current Employment Levels by Occupational Objectives and Occupational Categories
Integrated and Independent Petroleum Companies



b. Projected Hiring

The sample projected hiring figures provided by the respondents allow projections to be made for the total population within the domestic oil and gas industry. Table 8 shows a comparison of projected hiring for integrated and independent oil and gas companies:

Table 8

Total Projected Hiring Levels by Occupational Objectives
Domestic Oil and Gas Industry

	Integrated			Independent			TOTAL		
	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%
(% of total)			89.9			10.1			100.0
Exploration	100	366	48.5	18	66	77.7	118	432	51.5
Field Development and Production	47	172	22.8	3	11	12.9	50	183	21.8
Seismic Acquisition and Processing	29	106	14.1	1	4	4.7	30	110	13.1
E&P Research	22	81	10.7	0	0	0.0	22	81	9.6
Other	8	29	3.9	1	4	4.7	9	33	3.9
TOTAL	**206**	**754**	**100.0**	**23**	**85**	**100.0**	**229**	**839**	**99.9**

As with the current employment levels for integrated and independent oil and gas companies, there are some differences in the percentages of occupational category and objectives. Table 9 summarizes the differences:

Table 9

Comparison of Total Projected Hiring Levels by Occupational Objectives and Occupational Categories — Integrated and Independent Oil and Gas Companies
(in percentages for each occupational category)

	Geologists		Geophysicists		Related Professional Scientists		TOTAL	
	Integrated	Independent	Integrated	Independent	Integrated	Independent	Integrated	Independent
Exploration	50.0	77.1	57.0	87.9	12.4	0.0	48.4	77.7
Field Development and Production	36.7	22.9	10.7	0.0	7.9	0.0	22.7	12.9
Seismic Acquisition and Processing	0.0	0.0	21.5	12.1	46.1	0.0	14.1	4.7
E&P Research	12.2	0.0	9.5	0.0	9.0	0.0	10.7	0.0
Other	1.1	0.0	1.3	0.0	24.7	100.0	4.0	4.7
TOTAL	**100.0**	**100.0**	**100.0**	**100.0**	**100.1**	**100.0**	**99.9**	**100.0**

c. Net Gain in Employment

The difference between the projected total hiring and the projected total employment loss, due to terminations and retirements, provides the net gain. Table 10 presents the net gain for each type of petroleum company by occupational category:

Table 10

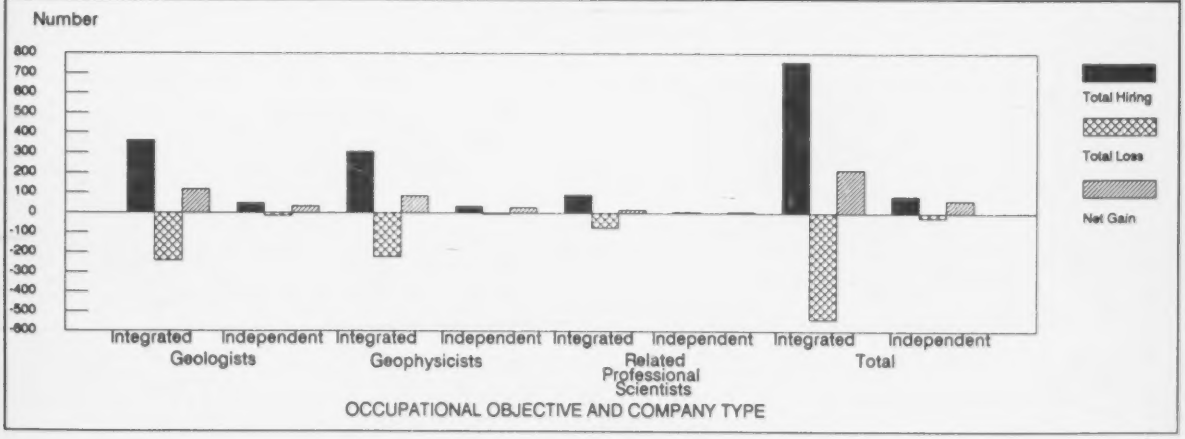
Projected Net Gain in Employment
Domestic Oil and Gas Industry

	Geologists		Geophysicists		Related Professional Scientists		TOTAL		
	Integrated	Independent	Integrated	Independent	Integrated	Independent	Integrated	Independent	
	Number	Number	Number	Number	Number	Number	Number	Number	
Projected Total Hiring	360	48	307	33	89	4	756	85	841
Projected Total Loss	242	15	223	7	74	0	539	22	561
Projected Net Gain	**118**	**33**	**84**	**26**	**15**	**4**	**217**	**63**	**280**

The projected net gain of 280 by the domestic oil and gas industry represents a 0.7% increase over current employment levels.

Figure C presents these data for total projected hiring, projected loss, and net gain:

Figure C
Net Gain in Employment
Domestic Oil and Gas Industry



d. Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires are as follows:

	Approximate Starting Salary	
Degree Level	**Integrated**	**Independent**
BA/BS	$30,000	$25,000
MA/MS	$35,000	$32,500
PhD	$37,500	$37,500

2. Domestic Mining/Minerals Industry

(Appendix, Tables II.1 - 7)

a. Current Employment Levels

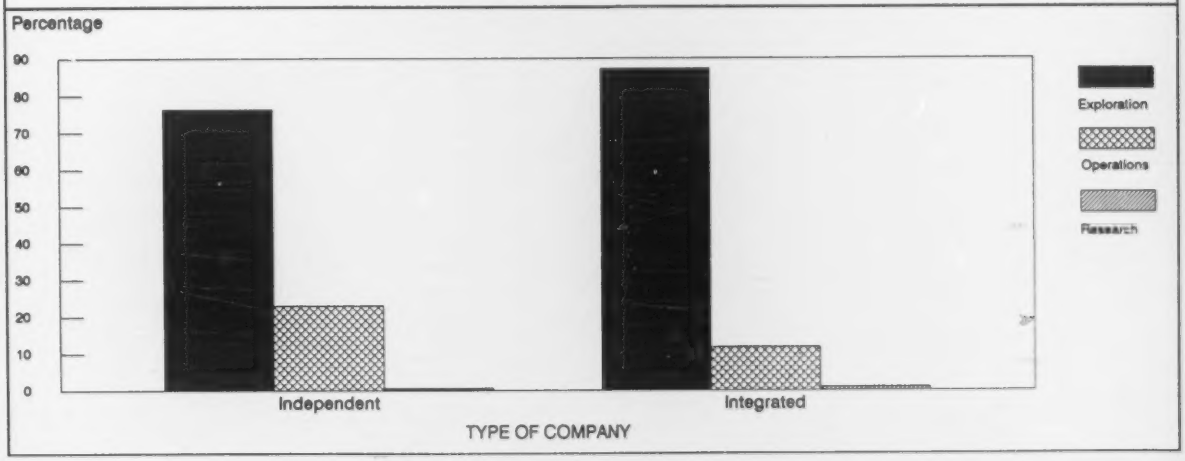
Respondents in this category indicated if they were an independent minerals producer or an integrated minerals/energy resource company. There were 5 independent mineral producing companies responding and 7 integrated minerals/energy resource companies. Table 11 and Figure D show the current and projected employment levels for each type of company:

Table 11

Current Employment Levels
Domestic Mining/Minerals Industry

	Independent			Integrated			TOTAL		
	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%
(% of total)			32.7			67.3			100.0
Exploration	113	2,756	76.4	266	6,488	87.2	379	9,244	83.7
Operations	34	829	23.0	36	878	11.8	70	1,707	15.5
Research	1	24	0.6	3	73	1.0	4	97	0.8
TOTAL	**148**	**3,609**	**100.0**	**305**	**7,439**	**100.1**	**453**	**11,048**	**100.0**

Figure D
Current Employment Levels
for Domestic Mining/Minerals Industry



Tables 12 and 13 show current employment levels for independent minerals producing and integrated minerals/energy resource companies:

Table 12

Current Employment Levels
Independent Minerals Producing Companies

	Geologists			Geochemists			Geophysicists			Engineering Geologists			Other			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj	%	Samp.	Proj.	%
(% of total)			97.3						1.3			1.3						99.9
Exploration	111	2,707	77.1	0	0	0.0	2	49	100.0	0	0	0.0	0	0	0.0	113	2,756	76.3
Operations	32	781	22.2	0	0	0.0	0	0	0.0	2	49	100.0	0	0	0.0	34	830	23.0
Research	1	24	0.7	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	1	24	0.7
TOTAL	144	3,512	100.0	0	0	0.0	2	49	100.0	2	49	100.0	0	0	0.0	148	3,610	100.0

Table 13

Current Employment Levels
Integrated Minerals/Energy Resource Companies

	Geologists			Geochemists			Geophysicists			Engineering Geologists			Other			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%
(% of Total)			72.5			0.7			4.6			2.0			20.3			100.1
Exploration	188	4,585	85.1	2	49	100.0	14	341	100.0	0	0	0.0	62	1,512	100.0	266	6,487	87.2
Operations	31	756	14.0	0	0	0.0	0	0	0.0	5	122	83.6	0	0	0.0	36	878	11.8
Research	2	49	0.9	0	0	0.0	0	0	0.0	1	24	16.4	0	0	0.0	3	73	1.0
TOTAL	221	5,390	100.0	2	49	100.0	14	341	100.0	6	146	100.0	62	1,512	100.0	305	7,438	100.0

Table 14 shows a comparison between independent minerals producing and integrated minerals/energy resource companies for occupational objectives and occupational category:

Table 14

**Comparison of Current Employment Levels by Occupational Objectives and Occupational Categories
Independent Minerals Producing Companies (Indep.) and Integrated Minerals/Energy Resource Companies (Integ.)
(in percentages for each occupational category)**

	Geologists		Geochemists		Geophysicists		Engineering Geologists		Other		TOTAL	
	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.
Exploration	77.1	85.1	0.0	100.0	100.0	100.0	0.0	0.0	0.0	0.0	76.3	87.2
Operations	22.2	14.0	0.0	0.0	0.0	0.0	100.0	83.6	0.0	0.0	23.0	11.8
Research	0.7	0.9	0.0	0.0	0.0	0.0	0.0	16.4	0.0	0.0	0.7	1.0
TOTAL	**100.0**	**100.0**	**0.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0.0**	**0.0**	**100.0**	**100.0**

b. Projected Hiring

The projected hiring plans for independent minerals producing and integrated minerals/energy resource companies differ primarily in the occupational objectives for which new hiring is anticipated. The independent companies will hire for exploration only, while the integrated companies will concentrate on exploration, in addition to hiring for operations and research. Tables 15 and 16 show the projected hiring plans for independent minerals producing and integrated minerals/energy resource companies.

Table 15

**Projected Hiring Levels
Domestic Mining/Minerals Industry**

	Independent			Integrated			TOTAL		
	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%
(% of total)			32.4			67.6			100.0
Exploration	11	268	100.0	16	390	87.2	27	658	83.7
Operations	0	0	0.0	6	146	11.8	6	146	15.5
Research	0	0	0.0	1	24	1.0	1	24	0.8
TOTAL	**11**	**268**	**100.0**	**23**	**560**	**100.1**	**34**	**828**	**100.0**

Table 16

**Comparison of Projected Hiring Levels and Occupational Objectives
Independent Minerals Producing Companies and Integrated Minerals/Energy Resource Companies
(in percentages for each occupational category)**

	Geologists		Geochemists		Geophysicists		Engineering Geologists		Other		TOTAL	
	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.
Exploration	100.0	68.3	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	69.6
Operations	0.0	27.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.1
Research	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
TOTAL	**100.0**	**100.0**	**0.0**	**0.0**	**0.0**	**100.0**	**0.0**	**0.0**	**0.0**	**0.0**	**100.0**	**100.0**

c. Net Gain in Employment

Table 17 shows the projected hiring totals, projected losses, and net gain in employment for independent minerals producing companies and integrated minerals/energy resource companies. Except for a small number of geophysicists to be hired by integrated minerals/energy resource companies, all the new hires will be geologists.

Table 17

Projected Net Gain in Employment
Independent Minerals Producing Companies and Integrated Minerals/Energy Resource Companies

	Geologists		Geochemists		Geophysicists		Engineering Geologists		Other		TOTAL		
	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Indep.	Integ.	Total
Projected Total Hiring	268	536	0	0	0	24	0	0	0	0	268	560	828
Projected Total Loss	146	97	0	0	0	0	0	0	0	0	146	97	243
Projected Net Gain	122	439	0	0	0	24	0	0	0	0	122	463	585

The projected net gain of 585 by the domestic mining/minerals industry represents a 5.3% increase over current employment levels.

d. Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires are as follows:

	Approximate Starting Salary	
Degree Level	**Independent**	**Integrated**
BA/BS	$25,000	$25,000
MA/MS	$27,500	$27,500
PhD	$30,000	$35,000

3. Federal and State Government Agencies

(Appendix, Tables III.1 - 7)

a. Current Employment Levels

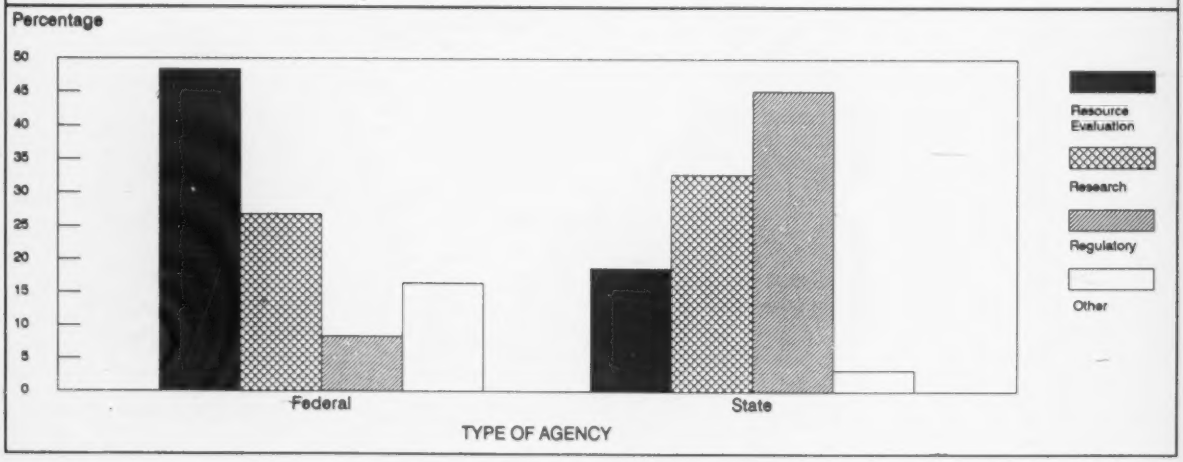
Respondents in this employer category indicated if they were federal or state government agencies. There were 9 federal agencies responding and 18 state government agencies. Table 18 and Figure E show the data for current employment levels for federal and state government agencies by occupational objective:

Table 18

Current Employment Levels and Occupational Objectives
Federal and State Government Agencies

	Federal			State			TOTAL		
	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%
(% of total)			89.2			10.8			100.0
Resource Evaluation	2,526	6,040	48.4	119	284	18.7	2,645	6,324	45.2
Research	1,396	3,348	26.8	207	497	32.8	1,603	3,845	27.5
Regulatory	433	1,039	8.3	286	686	45.2	719	1,725	12.3
Other	855	2,051	16.4	21	50	3.3	876	2,101	15.0
TOTAL	**5,210**	**12,478**	**99.9**	**633**	**1,517**	**100.0**	**5,843**	**13,995**	**100.0**

Figure E
Current Employment Levels and Occupational Objectives
Federal and State Government Agencies



Federal and State Government Agencies

Tables 19 and 20 show separately the current employment levels for federal and state government agencies by occupational objectives and occupational categories:

Table 19

Current Employment Levels by Occupational Objectives and Occupational Categories
Federal Government Agencies

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Other Related Scientists			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%
(% of total)			36.3			8.4			36.4			18.9			100.0
Resource Evaluation	768	1,824	40.2	96	230	22.0	1,205	2,890	63.6	457	1,096	46.6	2,526	6,040	48.4
Research	775	1,859	41.0	203	487	46.6	219	525	11.5	199	477	20.3	1,396	3,348	26.8
Regulatory	199	477	10.5	112	269	25.8	12	29	0.6	110	264	11.2	433	1,039	8.3
Other	156	374	8.2	24	58	5.6	460	1,103	24.3	215	516	21.9	855	2,051	16.4
TOTAL	1,898	4,534	99.9	435	1,044	100.0	1,896	4,547	100.0	981	2,353	100.0	5,210	12,478	99.9

Table 20

Current Employment Levels by Occupational Objectives and Occupational Categories
State Government Agencies

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Other Related Scientists			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%
(% of total)			51.2			3.2			30.2			15.4			100.0
Resource Evaluation	71	170	21.9	11	26	54.2	26	62	13.5	11	26	11.1	119	284	18.7
Research	135	324	41.7	9	22	45.8	37	89	19.4	26	62	26.5	207	498	32.8
Regulatory	107	257	33.1	0	0	0.0	123	295	64.4	56	134	57.3	286	686	45.2
Other	11	26	3.3	0	0	0.0	5	12	2.6	5	12	5.1	21	50	3.3
TOTAL	324	777	100.0	20	48	100.0	191	458	99.9	98	234	100.0	633	1,517	100.0

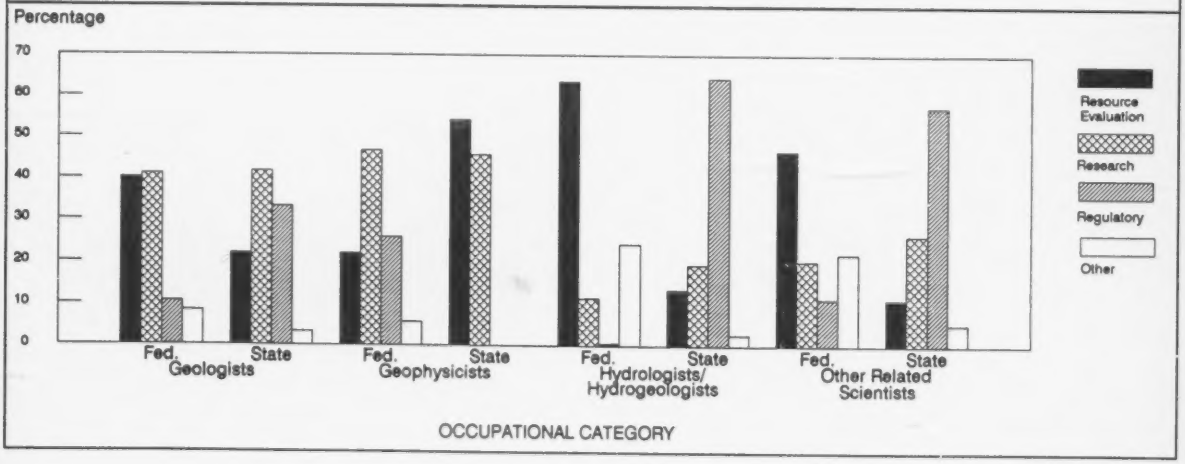
Table 21 and Figure F present a comparison of current employment levels for federal and state government agencies by occupational objectives and occupational categories:

Table 21

Comparison of Current Employment Levels by Occupational Objectives and Occupational Categories
Federal and State Government Agencies
(in percentages for each occupational category)

	Geologists		Geophysicists		Hydrologists/ Hydrogeologists		Other Related Scientists		TOTAL	
	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State
Resource Evaluation	40.2	21.9	22.0	54.2	63.6	13.5	46.6	11.1	48.4	18.7
Research	41.0	41.7	46.6	45.8	11.5	19.4	20.3	26.5	26.8	32.8
Regulatory	10.5	33.1	25.8	0.0	0.6	64.4	11.2	57.3	8.3	45.2
Other	8.2	3.3	5.6	0.0	24.3	2.6	21.9	5.1	16.4	3.3
TOTAL	**99.9**	**100.0**	**100.0**	**100.0**	**100.0**	**99.9**	**100.0**	**100.0**	**99.9**	**100.0**

Figure F
Current Employment Levels by Occupational Objectives and Occupational Categories
Federal and State Government Agencies



b. Projected Hiring

Table 22 shows the projected hiring levels for federal and state government agencies by occupational objectives. While federal agencies will employ about half of the new hires for resource evaluation, state agencies will employ about half of their new hires for regulatory concerns. By percentages, state government agencies will hire about twice as many people for research as federal government agencies.

Table 22

Projected Hiring Levels by Occupational Objectives
Federal and State Government Agencies

	Federal			State			TOTAL		
	Sample	Projected	%	Sample	Projected	%	Sample	Projected	%
(% of Total)			77.4			22.6			100.0
Resource Evaluation	160	384	51.7	9	21	9.7	169	405	42.2
Research	57	137	18.5	33	80	36.9	90	217	22.6
Regulatory	16	37	5.0	48	114	52.5	64	151	15.7
Other	77	184	24.8	1	2	0.9	78	186	19.4
TOTAL	**310**	**742**	**100.0**	**91**	**217**	**100.0**	**401**	**959**	**99.9**

When projected hiring is further broken down into occupational objectives and occupational categories, there are some notable differences in the percentages. Federal government agencies will use nearly 70% of the new geologists for resource evaluation, while state agencies will use about 66% of their new geologists for research. New geophysicists will be employed by the federal agencies for all occupational objectives, while state agencies will focus their new geophysicists on research alone. About 67% of the new federal hydrologists/hydrogeologists will work on resource evaluation; about 75% of the new state hydrologists/hydrogeologists will focus on regulatory affairs.

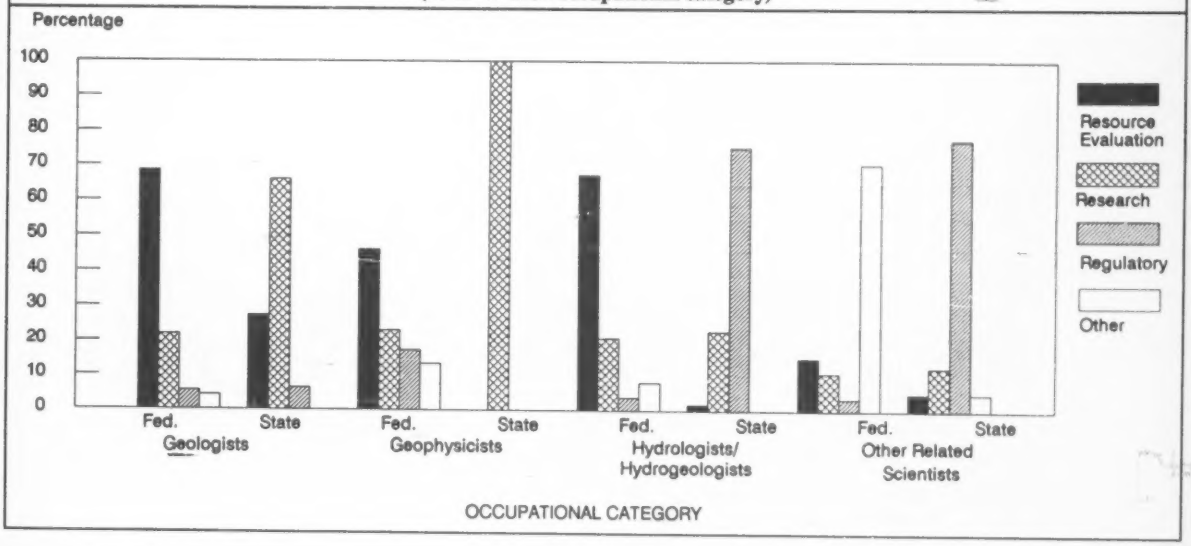
Table 23 and Figure G present the data:

Table 23

Comparison of Projected Hiring Levels and Occupational Objectives
Federal and State Government Agencies
(in percentages for each occupational category)

	Geologists		Geophysicists		Hydrologists/ Hydrogeologists		Other Related Scientists		TOTAL	
	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State
Resource Evaluation	68.5	27.4	46.2	0.0	67.3	1.9	15.2	5.0	51.7	9.7
Research	21.8	66.1	23.1	100.0	20.9	22.9	10.8	12.5	18.5	36.9
Regulatory	5.5	6.4	17.3	0.0	3.7	75.2	3.4	77.5	5.0	52.5
Other	4.2	0.0	13.5	0.0	8.1	0.0	70.6	5.0	24.8	0.9
TOTAL	**100.0**	**99.9**	**100.1**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Figure G
Comparison of Projected Hiring and Occupational Objectives
Federal and State Government Agencies
(as % for each occupational category)



c. Gain in Employment

For federal and state government agencies, the largest percentage of new hires and anticipated losses will be hydrologists/ hydrogeologists. Table 24 and Figure H show the net employment gain for federal and state government agencies:

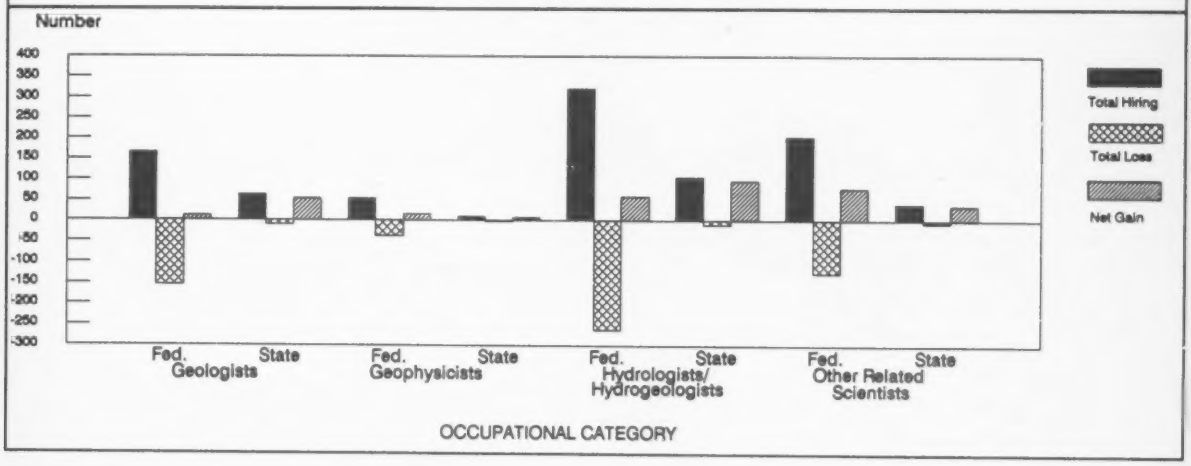
Table 24

Net Gain in Employment
Federal and State Government Agencies
by Occupational Category

	Geologists		Geophysicists		Hydrologists/ Hydrogeologists		Other Related Scientists		TOTAL		
	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	
Projected Total Hiring	165	62	52	10	321	105	204	40	742	217	959
Projected Total Loss	154	9	38	2	262	10	127	5	581	26	607
Projected Net Gain	**11**	**53**	**14**	**8**	**59**	**95**	**77**	**35**	**161**	**191**	**352**

The projected net gain of 352 by federal and state government agencies represents a 2.5% increase over current employment levels.

Figure H
Net Gain in Employment by Occupational Category
Federal and State Government Agencies



d. Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires are as follows:

	Approximate Starting Salary	
Degree Level	**Federal**	**State**
BA/BS	$20,000	$20,000
MA/MS	$25,500	$25,000
PhD	$35,000	$30,000

4. DOE-funded National Laboratories

(Appendix, Tables IV.1 - 7)

a. Employment Levels

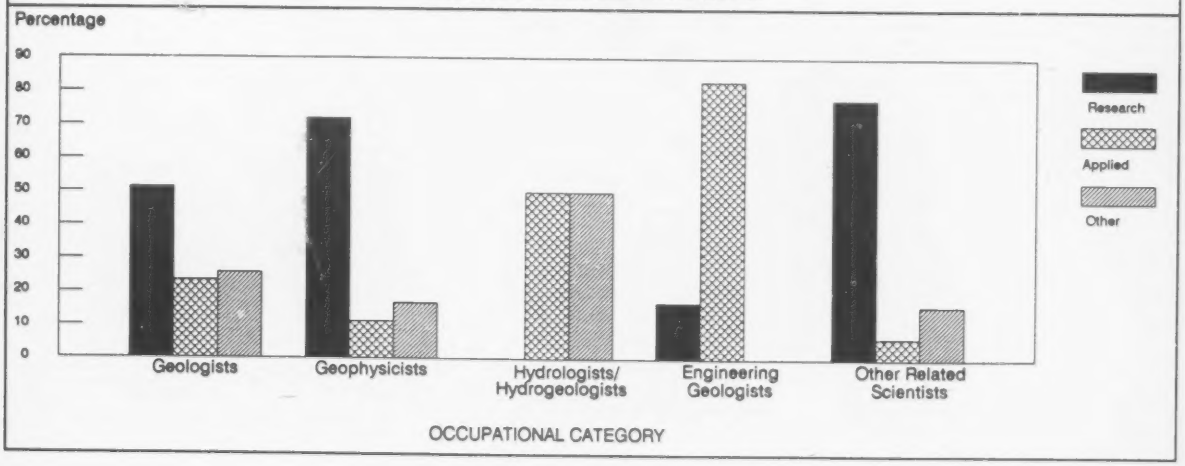
Surveys were returned by 3 of the 5 surveyed DOE-funded national laboratories. The majority of geoscientists working in DOE-funded national laboratories are involved in research (66.2%). By occupational category, only hydrologists/ hydrogeologists (0.0%) and engineering geologists (16.9%) are not predominantly involved in research. Table 25 and Figure I show the current employment levels for DOE-funded national laboratories by occupational objectives and occupational categories:

Table 25

Current Employment Levels by Occupational Objectives and Occupational Categories
DOE-funded National Laboratories

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Other Related Scientists			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%
(% of Total)			15.7			6.6			7.3			2.2			68.3			100.1
Research	22	239	51.1	13	141	71.9	0	0	0.0	1	11	16.9	146	1,587	77.7	182	1,978	66.2
Applied	10	109	23.3	2	22	11.2	10	109	50.0	5	54	83.1	12	130	6.4	39	424	14.2
Other	11	120	25.6	3	33	16.8	10	109	50.0	0	0	0.0	30	326	16.0	54	588	19.7
TOTAL	43	468	100.0	18	196	99.9	20	218	100.0	6	65	100.0	188	2,043	100.0	275	2,990	100.1

Figure I
Current Employment Levels by Occupational Categories and Occupational Objectives
DOE-funded National Laboratories



DOE-funded National Laboratories

b. Projected Hiring

DOE-funded national laboratories will hire geoscientists in equal percentages for research and applied activities (37.5% each of anticipated new hires). By occupational category, no new geologists or hydrologists/hydrogeologists will be hired for research. That objective will be the primary concern of new geophysicists (66.7%) and other related scientists (100.0%). Table 26 shows the projected hiring levels for DOE-funded national laboratories:

Table 26

Projected Hiring Levels by Occupational Objectives and Occupational Categories
DOE-funded National Laboratories

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Other Related Scientists			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%
(% of Total)			18.7			18.7			25.0			25.0			12.5			99.9
Research	0	0	0.0	2	22	66.7	0	0	0.0	2	22	50.0	2	22	100.0	6	66	37.5
Applied	1	11	33.3	1	11	33.3	2	22	50.0	2	22	50.0	0	0	0.0	6	66	37.5
Other	2	22	66.7	0	0	0.0	2	22	50.0	0	0	0.0	0	0	0.0	4	44	25.0
TOTAL	3	33	100.0	3	33	100.0	4	44	100.0	4	44	100.0	2	22	100.0	16	176	100.0

c. Net Gain in Employment

There are no anticipated losses in employees of DOE-funded national laboratories except among other related scientists. Table 27 presents the net gain in employment for this employer category:

Table 27

Net Gain in Employment
DOE-funded National Laboratories

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL
Projected Total Hiring	33	33	44	44	22	176
Projected Total Loss	0	0	0	0	55	55
Projected Net Gain	**33**	**33**	**44**	**44**	**-33**	**121**

The projected net gain of 121 by DOE-funded national laboratories represents a 4.0% increase over current employment levels.

d. Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$27,500
MA/MS	$32,500
PhD	$42,500

5. Geoscientific Consulting Firms

(Appendix, Table V.1 - 7)

a. Current Employment Levels

Of the 49 geoscientific consulting firms surveyed, 10 responded to the survey. Nearly 93% of the total current employment in geoscientific consulting firms is involved with environmental concerns. By occupational category, that focus holds true as well, with geologists showing the lowest percentage for that objective. Table 28 provides the current employment levels by occupational objectives and occupational categories for geoscientific consulting firms:

Table 28

Current Employment Levels by Occupational Objectives and Occupational Categories
Geoscientific Consulting Firms

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Other Related Scientists			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%
(% of Total)			31.2			2.7			28.1			32.5			5.5			100.0
Oil And Gas	58	433	17.3	0	0	0.0	0	0	0.0	9	67	2.6	2	55	3.4	69	515	6.4
Minerals	8	60	2.4	1	7	3.2	0	0	0.0	0	0	0.0	2	55	3.4	11	82	1.0
Environmental	269	2,007	80.3	28	209	96.8	302	2,254	100.0	340	2,537	97.4	55	410	93.2	994	7,417	92.6
TOTAL	335	2,500	100.0	29	216	100.0	302	2,254	100.0	349	2,604	100.0	59	440	100.0	1,074	8,014	100.1

b. Projected Hiring

The emphasis for hiring by geoscientific consulting firms will focus on environmental applications. By occupational category, only geologists and other related scientists will be hired for oil/gas applications, and only other related scientists will be hired for minerals investigations. Table 29 presents the projected hiring levels by occupational objectives and occupational categories for geoscientific consulting firms:

Table 29

Projected Hiring Levels
Geoscientific Consulting Firms

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Other Related Scientists			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%
(% of Total)			27.9			3.3			32.7			29.7			6.4			100.0
Oil and Gas	11	82	12.0	0	0	0.0	0	0	0.0	0	0	0.0	2	15	9.6	13	97	3.9
Minerals	2	15	2.2	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	2	15	0.6
Environmental	79	589	85.9	11	82	100.0	108	806	100.0	98	732	100.0	19	142	90.4	315	2,351	95.5
TOTAL	92	686	100.0	11	82	100.0	108	806	100.0	98	732	100.0	21	157	100.0	330	2,463	100.0

Geoscientific Consulting Firms

c. Net Gain in Employment

Geoscientific consulting firms will hire, in order of magnitude, hydrologists/hydrogeologists, engineering geologists, geologists, other related scientists, and geophysicists. Table 30 and Figure J present the data on net employment gain by occupational category:

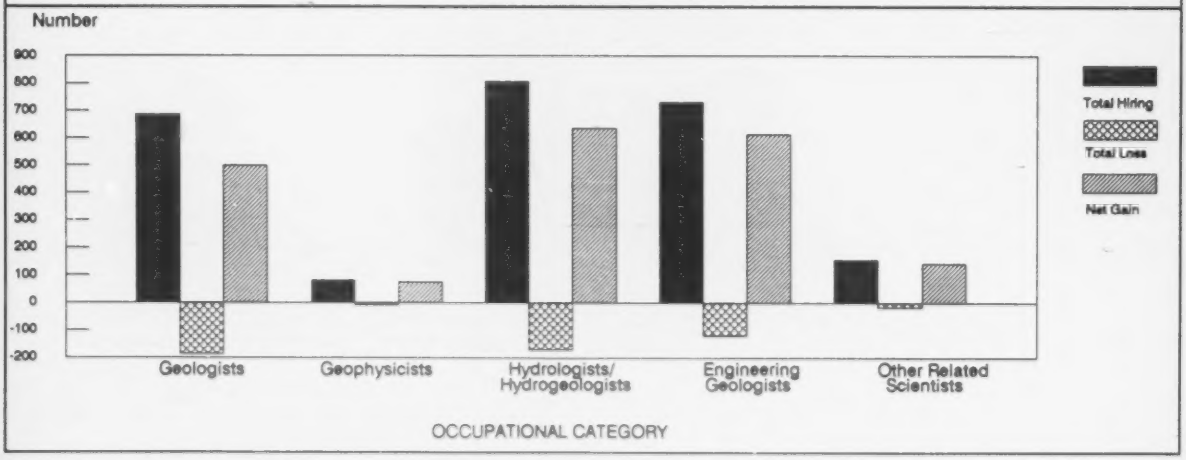
Table 30

Net Gain in Employment
Geoscientific Consulting Firms
by Occupational Category

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL
Projected Total Hiring	686	82	806	732	157	2,463
Projected Total Loss	186	7	171	119	14	497
Projected Net Gain	**500**	**75**	**635**	**613**	**143**	**1,966**

The projected net gain of 1,966 by geoscientific consulting firms represents a 24.5% increase over current employment levels.

Figure J
Net Gain in Employment
for Geoscientific Consulting Firms



d. Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$22,500
MA/MS	$25,000
PhD	$32,500

6. Academia

(Appendix, Tables VI.1 - 7)

a. Current Employment Levels

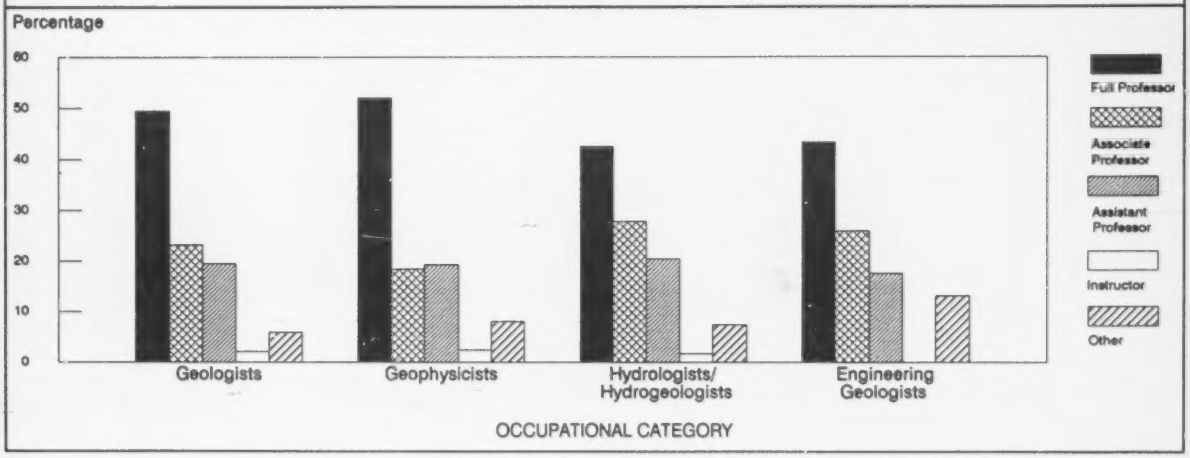
Survey forms were sent to 116 degree-granting geoscience departments. A total of 80 departments responded. According to AGI's *North American Survey of Geoscientists, U.S. Section,* faculty of degree-granting geoscience departments are engaged in teaching (46.3%) and research (29.5%). For that reason, the employment and hiring survey did not seek information on occupational objectives for the academic population. Academic rank was used to stratify employment levels, along with occupational category. Of the 4 occupational categories used, the majority of those in academia are geologists, followed by geophysicists, hydrologists/hydrogeologists, and engineering geologists. Table 31 and Figure K show the current employment levels for academia by academic rank and occupational category:

Table 31

Current Employment Levels by Academic Rank and Occupational Categories
Academia

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%
(% of Total)			79.3			12.8			5.5			2.4			100.0
Full Professor	384	3,523	49.5	65	596	52.0	23	211	42.5	10	92	43.4	482	4,422	49.3
Associate Professor	179	1,642	23.1	23	211	18.4	15	138	27.8	6	55	25.9	223	2,046	22.8
Assistant Professor	150	1,376	19.4	24	220	19.2	11	101	20.4	4	37	17.5	189	1,734	19.3
Instructor	16	147	2.1	3	28	2.4	1	9	1.8	0	0	0.0	20	184	2.1
Other	46	422	5.9	10	92	8.0	4	37	7.5	3	28	13.2	63	579	6.5
TOTAL	775	7,110	100.0	125	1,147	100.0	54	496	100.0	23	212	100.0	977	8,965	100.0

Figure K
Current Employment Levels by Academic Rank and Occupational Categories
Academia



b. Projected Hiring

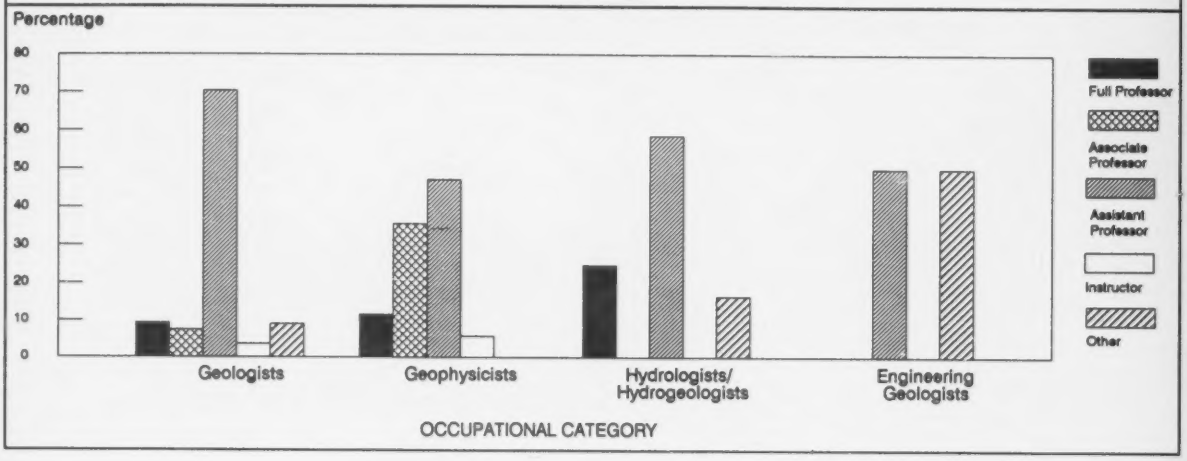
The projected hiring levels for academia reflect the current employment levels; the majority of new hires will be geologists, followed by geophysicists, hydrologists/hydrogeologists, and engineering geologists. By academic rank, 63.2% of all new hires will be at the assistant-professor level, followed by approximately equal numbers of full and associate professors. Table 32 and Figure L show the projected hiring levels for academia:

Table 32

Projected Hiring Levels
Academia

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			TOTAL		
	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%	Samp.	Proj.	%
(% of Total)			62.2			19.5			13.7			4.5			99.9
Full Professor	5	46	9.3	2	18	11.6	3	27	24.8	0	0	0.0	10	91	11.5
Associate Professor	4	37	7.5	6	55	35.5	0	0	0.0	0	0	0.0	10	92	11.6
Assistant Professor	38	348	70.4	8	73	47.1	7	64	58.7	2	18	50.0	55	503	63.3
Instructor	2	18	3.6	1	9	5.8	0	0	0.0	0	0	0.0	3	27	3.4
Other	5	45	9.1	0	0	0.0	2	18	16.5	2	18	50.0	9	81	10.2
TOTAL	54	494	99.9	17	155	100.0	12	109	100.0	4	36	100.0	87	794	100.0

Figure L
Projected Hiring Levels by Academic Rank and Occupational Categories
Academia



c. Net Gain in Employment

Table 33 and Figure M show the net gain in employment for the academic population:

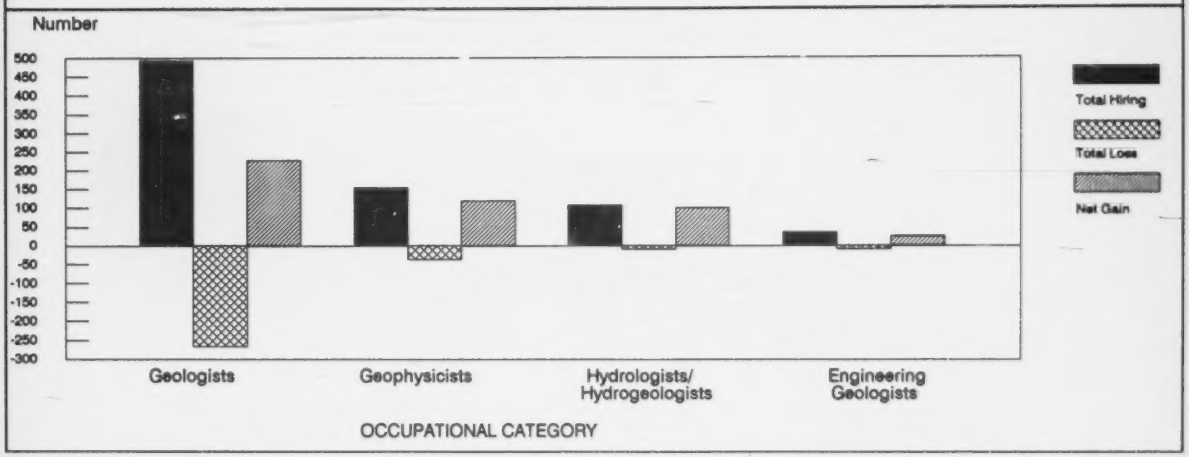
Table 33

Net Gain in Employment
Academia

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	TOTAL
Projected Total Hiring	494	155	109	36	794
Projected Total Loss	266	36	9	9	320
Projected Net Gain	**228**	**119**	**100**	**27**	**474**

The projected total hiring of 474 by academia represents a 5.3% increase over current employment levels.

Figure M
Net Gain in Employment by Occupational Category
Academia



d. Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$22,500
MA/MS	$25,000
PhD	$35,000

C. Summary of Employment and Hiring Projections

1. Current Employment Levels

Table 34 summarizes the current employment levels by occupational categories and the six geoscientific employers surveyed:

Table 34

Summary of Current Employment Levels by Occupational Categories and Geoscientific Employers (projected totals)

	Oil/Gas Industry	Mining/ Minerals Industry	Federal/ State Governments	DOE-funded Nat'l Labs	Geoscientific Consulting Firms	Academia	TOTAL
Geologists[1]	21,213	8,9511	5,311	468	2,500	7,110	45,553
Geophysicists	14,224	390	1,092	196	216	1,147	17,265
Engineering Geologists	0	195	0	65	2,604	212	3,076
Hydrologists/ Hydrogeologists	0	0	5,005	218	2,254	496	7,973
Related Professional Scientists[2]	3,020	1,512	2,587	2,043	440	0	9,602
TOTAL	**38,457**	**11,048**	**13,995**	**2,990**	**8,014**	**8,965**	**83,469**

1 Includes geochemists.

2 Includes the three "other" categories among the various employer groups.

2. Projected Hiring

Table 35 summarizes the projected hiring levels by occupational categories and the six geoscientific employers surveyed:

Table 35

Summary of Projected Hiring Levels by Occupational Categories and Geoscientific Employers

	Oil/Gas Industry	Mining/ Minerals Industry[1]	Federal/ State Governments[2]	DOE-funded Nat'l Labs[3]	Geoscientific Consulting[4]	Academia	TOTAL
Geologists	408	804	227	33	686	494	2,652
Geophysicists	340	24	62	33	82	155	696
Engineering Geologists	0	0	0	44	732	36	812
Hydrologists/ Hydrogeologists	0	0	426	44	806	109	1,385
Related Professional Scientists	93	0	244	22	157	0	516
TOTAL	**841**	**828**	**959**	**176**	**2,463**	**794**	**6,061**
% Increase over Current Employment	2.2	7.5	6.9	5.9	30.8	8.8	7.3

1 Since the time of the survey mailing, several questions have arisen concerning the percentages of employment reported for some of the employer groups. Those percentages affect the hiring projections made in this report. What follows are adjustments that should be considered when evaluating the hiring projections.

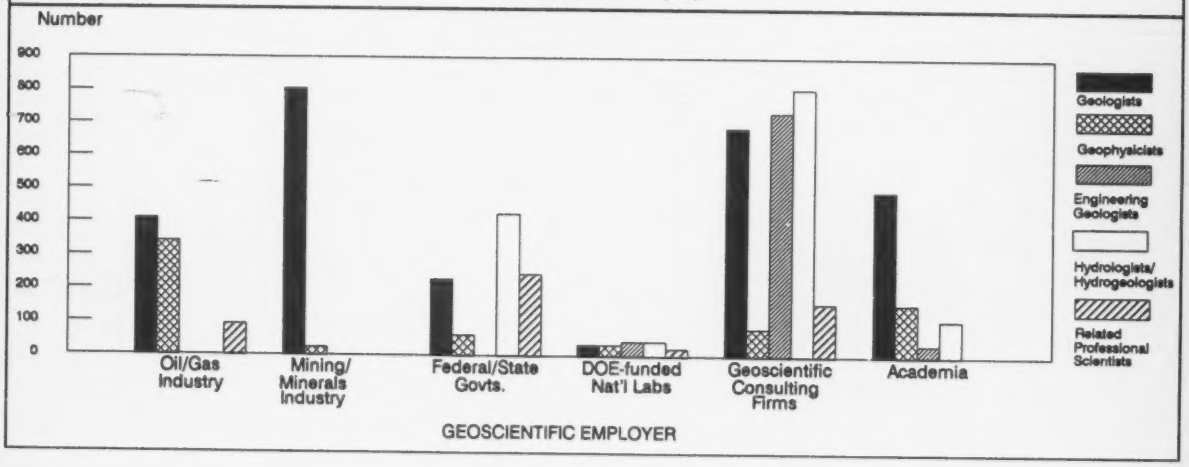
There is every indication that for the mining/minerals industry, the companies surveyed represent nearly 10% of the projected hiring levels, although they account for only 4.1% of those currently employed. Projections reported here are roughly twice the new jobs actually available.

2 At the time of the survey, federal/state government agencies reported on their current employment levels and hiring projections prior to final provisions of the FY 1988 budget. According to Penelope Hanshaw, Deputy Chief Geologist, U.S. Geological Survey, Reston, VA, "...both budget and staff ceiling reductions are expected for FY 1988 and are projected for the next several fiscal years. The Department of the Interior is under a total hiring freeze of indefinite duration." (From "Future Employment Opportunities in the Geological Sciences," a review of presentations made at the Geological Society of America's annual meeting, Phoenix, AZ, October, 1987.) Figures concerning federal hiring of geoscientists should be interpreted accordingly.

3 For similar reasons, projected hiring for DOE-funded national laboratories may be off by a factor of 50%. However, the Department of Energy is not one of those federal agencies specifically under budget and staff reduction constraints. The projections developed in this report should be interpreted with federal funding vagaries in mind.

4 While projections for geoscientific consulting firms seem relatively large, it is likely that federal agencies will have to increase their contracts with the private sector (e.g., geoscientific consulting firms). The reduction in federal hiring may be reflected in greater hiring levels for geoscientific consulting firms.

Figure N
Summary of Projected Hiring Levels
by Occupational Categories
and Geoscientific Employers



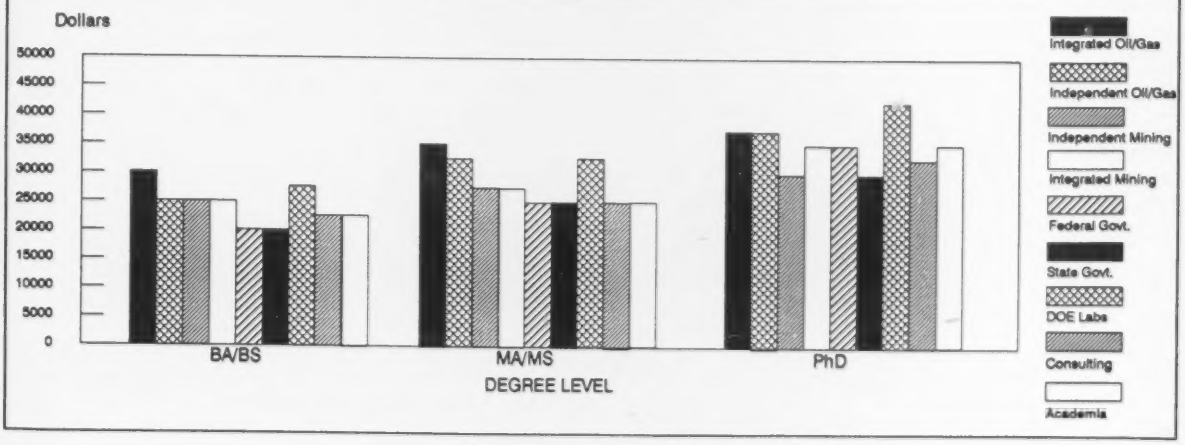
D. Summary of Starting Salaries

Table 36

Approximate Starting Salaries for Inexperienced New Hires by Employer Cateogory and Degree Level

	BA/BS	MA/MS	PhD
EMPLOYER CATEGORY			
Domestic Oil and Gas Industry			
Integrated Petroleum Company	$30,000	$35,000	$37,500
Independent or Subsidiary E&P Company	$25,000	$32,500	$37,500
Domestic Mining/Minerals Industry			
Independent Minerals Producing Company	$25,000	$27,500	$30,000
Integrated Minerals/Energy Resource Company	$25,000	$27,500	$35,000
Federal and State Government			
Federal Agency	$20,000	$25,000	$35,000
State Agency	$20,000	$25,000	$30,000
DOE-funded National Laboratories	$27,500	$32,500	$42,500
Consulting Firms	$22,500	$25,000	$32,500
Academia	$22,500	$25,000	$35,000

Figure O
Approximate Starting Salaries for Inexperienced New Hires by Employer Categories and Degree Level



Appendix

Table I.1

Current Employment Levels
Domestic Oil and Gas Industry
(Sample, as of 12/31/87)

ACTIVITY		Geologists[1]	Geophysicists	Related Professional Scientists[2]	TOTAL
Exploration					
	Integrated	1,233	1,039	38	2,310
	Independent	2,957	1,431	133	4,521
	Total	**4,190**	**2,470**	**171**	**6,831**
Field Development and Production					
	Integrated	1,008	142	58	1,208
	Independent	353	44	0	397
	Total	**1,361**	**186**	**58**	**1,605**
Seismic Acquisition and Processing					
	Integrated	15	331	235	581
	Independent	0	617	0	617
	Total	**15**	**948**	**235**	**1,198**
E&P Research					
	Integrated	168	269	182	619
	Independent	47	0	22	69
	Total	**215**	**269**	**204**	**688**
Other					
	Integrated	10	10	90	110
	Independent	0	0	66	66
	Total	**10**	**10**	**156**	**176**
	Total Integrated	**2,434**	**1,791**	**603**	**4,828**
	Total Independent	**3,357**	**2,092**	**221**	**5,670**
	TOTAL	**5,791**	**3,883**	**824**	**10,498**

1 Includes geochemists

2 E.g. computer scientists processing geoscientific data bases, chemists in geochemistry laboratories

Table I.2

Sample Projected Number of Inexperienced New Hires
Domestic Oil and Gas Industry

ACTIVITY		Geologists	Geophysicists	Related Professional Scientists	TOTAL
Exploration					
	Integrated	36	43	3	82
	Independent	0	0	0	0
	Total	**78**	**93**	**3**	**82**
Field Development and Production					
	Integrated	33	7	2	42
	Independent	0	0	0	0
	Total	**33**	**7**	**2**	**42**
Seismic Acquisition and Processing					
	Integrated	0	16	10	26
	Independent	0	0	0	0
	Total	**0**	**16**	**10**	**26**
E&P Research					
	Integrated	10	6	1	17
	Independent	0	0	0	0
	Total	**10**	**6**	**1**	**17**
Other					
	Integrated	0	0	0	0
	Independent	0	0	0	0
	Total	**0**	**0**	**0**	**0**
	Total Integrated	**79**	**72**	**16**	**167**
	Total Independent	**0**	**0**	**0**	**0**
	TOTAL	**79**	**72**	**16**	**167**

Table I.3

Sample Projected Number of Experienced Hires
Domestic Oil and Gas Industry

ACTIVITY		Geologists	Geophysicists	Related Professional Scientists	TOTAL
Exploration					
	Integrated	13	5	0	18
	Independent	10	8	0	18
	Total	**23**	**13**	**0**	**36**
Field Development and Production					
	Integrated	3	2	0	5
	Independent	3	0	0	3
	Total	**6**	**2**	**0**	**8**
Seismic Acquisition and Processing					
	Integrated	0	2	1	3
	Independent	0	1	0	1
	Total	**0**	**3**	**1**	**4**
E&P Research					
	Integrated	2	2	1	5
	Independent	0	0	0	0
	Total	**2**	**2**	**1**	**5**
Other					
	Integrated	1	1	6	8
	Independent	0	0	1	1
	Total	**1**	**1**	**7**	**9**
	Total Integrated	**19**	**12**	**9**	**40**
	Total Independent	**13**	**9**	**1**	**23**
	TOTAL	**32**	**21**	**10**	**63**

Table I.4

Total Projected Inexperienced New Hires
Domestic Oil and Gas Industry
(total rounded to nearest 50)

ACTIVITY		Geologists	Geophysicists	Related Professional Scientists	TOTAL	
Exploration						
	Integrated	132	157	11	300	
	Independent	0	0	0	0	
	Total	**132**	**157**	**11**	**300**	
Field Development and Production						
	Integrated	121	26	7	154	
	Independent	0	0	0	0	
	Total	**121**	**26**	**7**	**154**	
Seismic Acquisition and Processing						
	Integrated	0	59	37	96	
	Independent	0	0	0	0	
	Total	**0**	**59**	**37**	**96**	
E&P Research						
	Integrated	37	22	4	63	
	Independent	0	0	0	0	
	Total	**37**	**22**	**4**	**63**	
Other						
	Integrated	0	0	0	0	
	Independent	0	0	0	0	
	Total	**0**	**0**	**0**	**0**	
	Total Integrated	**290**	**264**	**59**	**613**	
	Total Independent	**0**	**0**	**0**	**0**	
	TOTAL	**290**	**264**	**59**	**(613)**	**600**

Table I.5

Total Projected Experienced Hiring
Domestic Oil and Gas Industry
(total rounded to nearest 50)

ACTIVITY		Geologists	Geophysicists	Related Professional Scientists	TOTAL	
Exploration						
	Integrated	48	18	0	66	
	Independent	37	29	0	66	
	Total	**85**	**47**	**0**	**132**	
Field Development and Production						
	Integrated	11	7	0	18	
	Independent	11	0	0	11	
	Total	**22**	**7**	**0**	**29**	
Seismic Acquisition and Processing						
	Integrated	0	7	4	11	
	Independent	0	4	0	4	
	Total	**0**	**11**	**4**	**15**	
E&P Research						
	Integrated	7	7	4	18	
	Independent	0	0	0	0	
	Total	**7**	**7**	**4**	**18**	
Other						
	Integrated	4	4	22	30	
	Independent	0	0	4	4	
	Total	**4**	**4**	**26**	**34**	
	Total Integrated	**70**	**43**	**30**	**143**	
	Total Independent	**48**	**33**	**4**	**85**	
	TOTAL	**118**	**76**	**34**	**(228)**	**250**

Table I.6

Total Projected Hiring (Inexperienced and Experienced)
Domestic Oil and Gas Industry
(total rounded to nearest 50)

ACTIVITY		Geologists	Geophysicists	Related Professional Scientists	TOTAL	
Exploration						
	Integrated	180	175	11	366	
	Independent	37	29	0	66	
	Total	**217**	**204**	**11**	**432**	
Field Development and Production						
	Integrated	132	33	7	172	
	Independent	11	0	0	11	
	Total	**143**	**33**	**7**	**183**	
Seismic Acquisition and Processing						
	Integrated	0	66	41	107	
	Independent	0	4	0	4	
	Total	**0**	**70**	**41**	**111**	
E&P Research						
	Integrated	44	29	8	81	
	Independent	0	0	0	0	
	Total	**44**	**29**	**8**	**81**	
Other						
	Integrated	4	4	22	30	
	Independent	0	0	4	4	
	Total	**4**	**4**	**26**	**34**	
	Total Integrated	**360**	**307**	**89**	**756**	
	Total Independent	**48**	**33**	**4**	**85**	
	TOTAL	**408**	**340**	**93**	**(841)**	**850**

Table I.7

Net Gain in Employment
Domestic Oil and Gas Industry
(total rounded to nearest 50)

		Geologists	Geophysicists	Related Professional Scientists	TOTAL	
Projected Total Hiring						
	Integrated	360	307	89	756	
	Independent	48	33	4	85	
	Total	**408**	**340**	**93**	**841**	
PROJECTED EMPLOYMENT LOSS						
Retirements						
	Integrated	37	29	4	70	
	Independent	4	0	0	4	
	Total	**41**	**29**	**4**	**74**	
Terminations						
	Integrated	205	194	70	469	
	Independent	11	7	0	18	
	Total	**216**	**201**	**70**	**487**	
	Combined TOTAL	**257**	**230**	**74**	**561**	
NET EMPLOYMENT GAIN						
Projected Total Hiring						
	Integrated	360	307	89	756	
	Independent	48	33	4	85	
	Total	**408**	**340**	**93**	**(841)**	**850**
Projected Total Loss						
	Integrated	242	223	74	539	
	Independent	15	7	0	22	
	Total	**257**	**230**	**74**	**(561)**	**550**
Projected Net Gain						
	Integrated	118	84	15	217	
	Independent	33	26	4	63	
	TOTAL	**151**	**110**	**19**	**(280)**	**300**

Table II.1

Current Employment Levels
Domestic Mining/Minerals Industry
(Sample, as of 12/31/87)

ACTIVITY	Geologists	Geochemists	Geophysicists	Engineering Geologists	Other	TOTAL
Exploration						
Independent	111	0	2	0	0	113
Integrated	188	2	14	0	62	266
Total	**299**	**2**	**16**	**0**	**62**	**379**
Operations						
Independent	32	0	0	2	0	34
Integrated	31	0	0	5	0	36
Total	**63**	**0**	**0**	**7**	**0**	**70**
Research						
Independent	1	0	0	0	0	1
Integrated	2	0	0	1	0	3
Total	**3**	**0**	**0**	**1**	**0**	**4**
Total Independent	**144**	**0**	**2**	**2**	**0**	**148**
Total Integrated	**221**	**2**	**14**	**6**	**62**	**305**
TOTAL	**365**	**2**	**16**	**8**	**62**	**453**

Table II.2

Sample Projected Number of Inexperienced New Hires
Domestic Mining/Minerals Industry

ACTIVITY	Geologists	Geochemists	Geophysicists	Engineering Geologists	Other	TOTAL
Exploration						
Independent	5	0	0	0	0	5
Integrated	4	0	0	0	0	4
Total	**9**	**0**	**0**	**0**	**0**	**9**
Operations						
Independent	0	0	0	0	0	0
Integrated	3	0	0	0	0	3
Total	**3**	**0**	**0**	**0**	**0**	**3**
Research						
Independent	0	0	0	0	0	0
Integrated	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Total Independent	**5**	**0**	**0**	**0**	**0**	**5**
Total Integrated	**7**	**0**	**0**	**0**	**0**	**7**
TOTAL	**12**	**0**	**0**	**0**	**0**	**12**

Table II.3

Sample Projected Number of Experienced Hires
Domestic Mining/Minerals Industry

ACTIVITY	Geologists	Geochemists	Geophysicists	Engineering Geologists	Other	TOTAL
Exploration						
Independent	6	0	0	0	0	6
Integrated	11	0	1	0	0	12
Total	**17**	**0**	**1**	**0**	**0**	**18**
Operations						
Independent	0	0	0	0	0	0
Integrated	3	0	0	0	0	3
Total	**3**	**0**	**0**	**0**	**0**	**3**
Research						
Independent	0	0	0	0	0	0
Integrated	1	0	0	0	0	0
Total	**1**	**0**	**0**	**0**	**0**	**1**
Total Independent	**6**	**0**	**0**	**0**	**0**	**6**
Total Integrated	**15**	**0**	**1**	**0**	**0**	**16**
TOTAL	**21**	**0**	**1**	**0**	**0**	**22**

Table II.4

Total Projected New Hires
Domestic Mining/Minerals Industry
(total rounded to nearest 50)

ACTIVITY	Geologists	Geochemists	Geophysicists	Engineering Geologists	Other	TOTAL
Exploration						
Independent	122	0	0	0	0	122
Integrated	98	0	24	0	0	122
Total	**220**	**0**	**24**	**0**	**0**	**244**
Operations						
Independent	0	0	0	0	0	0
Integrated	73	0	0	0	0	73
Total	**73**	**0**	**0**	**0**	**0**	**73**
Research						
Independent	0	0	0	0	0	0
Integrated	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Total Independent	**122**	**0**	**0**	**0**	**0**	**122**
Total Integrated	**171**	**0**	**24**	**0**	**0**	**195**
TOTAL	**293**	**0**	**24**	**0**	**0**	**(317)** 300

Table II.5

Total Projected Experienced Hires
Domestic Mining/Minerals Industry
(total rounded to nearest 50)

ACTIVITY	Geologists	Geochemists	Geophysicists	Engineering Geologists	Other	TOTAL	
Exploration							
Independent	146	0	0	0	0	146	
Integrated	268	0	24	0	0	292	
Total	**414**	**0**	**24**	**0**	**0**	**438**	
Operations							
Independent	0	0	0	0	0	0	
Integrated	73	0	0	0	0	73	
Total	**73**	**0**	**0**	**0**	**0**	**73**	
Research							
Independent	0	0	0	0	0	0	
Integrated	24	0	0	0	0	0	
Total	**24**	**0**	**0**	**0**	**0**	**0**	
Total Independent	**146**	**0**	**0**	**0**	**0**	**146**	
Total Integrated	**365**	**0**	**24**	**0**	**0**	**389**	
TOTAL	**511**	**0**	**24**	**0**	**0**	**(535)**	**550**

Table II.6

Total Projected Hiring (Inexperienced and Experienced)
Domestic Mining/Minerals Industry
(total rounded to nearest 50)

ACTIVITY	Geologists	Geochemists	Geophysicists	Engineering Geologists	Other	TOTAL	
Exploration							
Independent	268	0	0	0	0	268	
Integrated	366	0	24	0	0	390	
Total	**634**	**0**	**24**	**0**	**0**	**658**	
Operations							
Independent	0	0	0	0	0	0	
Integrated	146	0	0	0	0	146	
Total	**146**	**0**	**0**	**0**	**0**	**146**	
Research							
Independent	0	0	0	0	0	0	
Integrated	24	0	0	0	0	24	
Total	**24**	**0**	**0**	**0**	**0**	**24**	
Total Independent	**268**	**0**	**0**	**0**	**0**	**268**	
Total Integrated	**536**	**0**	**24**	**0**	**0**	**560**	
TOTAL	**804**	**0**	**24**	**0**	**0**	**(828)**	**850**

Table II.7

Net Gain in Employment
Domestic Mining/Minerals Industry
(total rounded to nearest 50)

	Geologists	Geochemists	Geophysicists	Engineering Geologists	Other	TOTAL	
PROJECTED TOTAL HIRING							
Independent	268	0	0	0	0	268	
Integrated	536	0	24	0	0	560	
Total	**804**	**0**	**24**	**0**	**0**	**828**	
PROJECTED EMPLOYMENT LOSS							
Retirements							
Independent	0					0	
Integrated	0					0	
Total	**0**					**0**	
Terminations							
Independent	146					146	
Integrated	97					97	
Total	**243**					**243**	
Combined TOTAL	**243**					**243**	
NET EMPLOYMENT GAIN							
Projected Total Hiring							
Independent	268	0	0	0	0	268	
Integrated	536	0	24	0	0	560	
Total	**804**	**0**	**24**	**0**	**0**	**(828)**	**850**
Projected Total Loss							
Independent	146					146	
Integrated	97					97	
Total	**243**					**(243)**	**250**
Projected Net Gain							
Independent	122					122	
Integrated	439		24			463	
Total	**561**		**24**			**(585)**	**600**

Table III.1

Current Employment Levels
Federal and State Government Agencies (Sample, as of 12/31/87)

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Other Related Scientists	TOTAL
Resource Evaluation					
Federal	768	96	1,205	457	2,526
State	71	11	26	11	119
Total	**839**	**107**	**1,231**	**468**	**2,645**
Research					
Federal	775	203	219	199	1,396
State	135	9	37	26	207
Total	**910**	**212**	**256**	**225**	**1,603**
Regulatory					
Federal	199	112	12	110	433
State	107	0	123	56	286
Total	**306**	**112**	**135**	**166**	**719**
Other					
Federal	156	24	460	215	855
State	11	0	5	5	21
Total	**167**	**24**	**465**	**220**	**876**
Total Federal	**1,898**	**435**	**1,896**	**981**	**5,210**
Total State	**324**	**20**	**191**	**98**	**633**
TOTAL	**2,222**	**455**	**2,087**	**1,079**	**5,843**

Table III.2

Sample Projected Number of Inexperienced New Hires
Federal and State Government Agencies

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Other Related Scientists	TOTAL
Resource Evaluation					
Federal	35	10	85	5	135
State	5	0	1	17	
Total	**40**	**10**	**86**	**6**	**142**
Research					
Federal	12	3	28	5	48
State	12	4	6	0	22
Total	**24**	**7**	**34**	**5**	**70**
Regulatory					
Federal	1	3	2	2	8
State	1	0	29	13	43
Total	**2**	**3**	**31**	**15**	**51**
Other					
Federal	1	3	10	50	64
State	0	0	0	1	1
Total	**1**	**3**	**10**	**51**	**65**
Total Federal	**49**	**19**	**125**	**62**	**255**
Total State	**18**	**4**	**36**	**15**	**73**
TOTAL	**67**	**23**	**161**	**77**	**328**

Table III.3

Sample Projected Number of Experienced Hires
Federal and State Government Agencies

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Other Related Scientists	TOTAL
Resource Evaluation					
Federal	12	0	5	8	25
State	2	0	0	0	2
Total	**14**	**0**	**5**	**8**	**27**
Research					
Federal	3	2	0	4	9
State	5	0	4	2	11
Total	**8**	**2**	**4**	**6**	**20**
Regulatory					
Federal	3	1	3	1	8
State	1	0	4	0	5
Total	**4**	**1**	**7**	**1**	**13**
Other					
Federal	2	0	1	10	13
State	0	0	0	0	0
Total	**2**	**0**	**1**	**10**	**13**
Total Federal	**20**	**3**	**9**	**23**	**55**
Total State	**8**	**0**	**8**	**2**	**18**
TOTAL	**28**	**3**	**17**	**25**	**73**

Table III.4

Total Projected New Hires
Federal and State Government Agencies
(total rounded to nearest 50)

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Other Related Scientists	TOTAL	
Resource Evaluation						
Federal	84	24	204	12	324	
State	12	0	2	2	16	
Total	**96**	**24**	**206**	**14**	**340**	
Research						
Federal	29	7	67	12	115	
State	29	10	14	0	53	
Total	**58**	**17**	**81**	**12**	**168**	
Regulatory						
Federal	2	7	5	5	19	
State	2	0	69	31	102	
Total	**4**	**7**	**74**	**36**	**121**	
Other						
Federal	2	7	24	120	153	
State	0	0	0	2	20	
Total	**2**	**7**	**24**	**122**	**173**	
Total Federal	**117**	**45**	**300**	**149**	**611**	
Total State	**43**	**10**	**85**	**35**	**173**	
TOTAL	**160**	**55**	**385**	**184**	**(784)**	**800**

Table III.5

Total Projected Experienced Hires
Federal and State Government Agencies
(total rounded to nearest 50)

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Other Related Scientists	TOTAL	
Resource Evaluation						
Federal	29	0	12	19	60	
State	5	0	0	0	5	
Total	**34**	**0**	**12**	**19**	**65**	
Research						
Federal	7	5	0	10	22	
State	12	0	10	5	27	
Total	**19**	**5**	**10**	**15**	**49**	
Regulatory						
Federal	7	2	7	2	18	
State	2	0	10	0	12	
Total	**9**	**2**	**17**	**2**	**30**	
Other						
Federal	5	0	2	24	31	
State	0	0	0	0	0	
Total	**5**	**0**	**2**	**24**	**31**	
Total Federal	**48**	**7**	**21**	**55**	**131**	
Total State	**19**	**0**	**20**	**5**	**44**	
TOTAL	**67**	**7**	**41**	**60**	**(175)**	**150**

Table III.6

Total Projected Hiring (Inexperienced and Experienced)
Federal and State Government Agencies
(total rounded to nearest 50)

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Other Related Scientists	TOTAL	
Resource Evaluation						
Federal	113	24	216	31	384	
State	17	0	2	2	21	
Total	**130**	**24**	**218**	**33**	**405**	
Research						
Federal	36	12	67	22	137	
State	41	10	24	5	80	
Total	**77**	**22**	**91**	**27**	**217**	
Regulatory						
Federal	9	9	12	7	37	
State	4	0	79	31	114	
Total	**13**	**9**	**91**	**38**	**151**	
Other						
Federal	7	7	26	144	184	
State	0	0	0	2	2	
Total	**7**	**7**	**26**	**146**	**186**	
Total Federal	**165**	**52**	**321**	**204**	**742**	
Total State	**62**	**10**	**105**	**40**	**217**	
TOTAL	**227**	**62**	**426**	**244**	**(959)**	**950**

Table III.7

Net Gain in Employment
Federal and State Government Agencies
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Other Related Scientists	TOTAL	
Projected Total Hiring						
Federal	165	52	321	204	742	
State	62	10	105	40	217	
Total	**227**	**62**	**426**	**244**	**959**	
PROJECTED EMPLOYMENT LOSS						
Retirements						
Federal	113	26	216	98	453	
State	7	2	5	0	14	
Total	**120**	**28**	**221**	**98**	**467**	
Terminations						
Federal	41	12	46	29	128	
State	2	0	5	5	12	
Total	**43**	**12**	**51**	**34**	**140**	
COMBINED TOTAL	163	40	272	132	607	
NET EMPLOYMENT GAIN						
Projected Total Hiring						
Federal	165	52	321	204	742	
State	62	10	105	40	217	
Total	**227**	**62**	**426**	**244**	(959)	950
Projected Total Loss						
Federal	154	38	262	127	581	
State	9	2	10	5	26	
Total	**163**	**40**	**272**	**132**	(607)	600
Projected Net Gain						
Federal	11	14	59	77	161	
State	53	8	95	35	191	
Total	**64**	**22**	**154**	**112**	(352)	350

Table IV.1

Current Employment Levels
DOE-funded National Laboratories
(Sample, as of 12/31/87)

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL
Research	22	13	0	1	146	182
Applied	10	2	10	5	12	39
Other	11	3	10	0	30	54
TOTAL	**43**	**18**	**20**	**6**	**188**	**275**

Table IV.2

Sample Projected Number of Inexperienced New Hires
DOE-funded National Laboratories

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL
Research	0	0	0	0	0	0
Applied	1	1	2	2	0	6
Other	0	0	0	0	0	0
TOTAL	**1**	**1**	**2**	**2**	**0**	**6**

Table IV.3

Sample Projected Number of Experienced Hires
DOE-funded National Laboratories

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL
Research	0	2	0	2	2	6
Applied	0	0	0	0	0	0
Other	2	0	2	0	0	4
TOTAL	**2**	**2**	**2**	**2**	**2**	**10**

Table IV.4

Total Projected Inexperienced New Hires
DOE-funded National Laboratories
(total rounded to nearest 50)

ACTIVITY	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL	
Research	0	0	0	0	0	0	
Applied	11	11	22	22	0	66	
Other	0	0	0	0	0	0	
TOTAL	**11**	**11**	**22**	**22**	**0**	**(66)**	**50**

Table IV.5

Total Projected Experienced Hires
DOE-funded National Laboratories
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL	
ACTIVITY							
Research	0	22	0	22	22	66	
Applied	0	0	0	0	0	0	
Other	22	0	22	0	0	44	
TOTAL	**22**	**22**	**22**	**22**	**22**	**(110)**	**100**

Table IV.6

Total Projected Hiring (Inexperienced and Experienced)
DOE-funded National Laboratories
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL	
ACTIVITY							
Research	0	22	0	22	22	66	
Applied	11	11	22	22	0	66	
Other	22	0	22	0	0	44	
TOTAL	**33**	**33**	**44**	**44**	**22**	**(176)**	**150**

Table IV.7

Net Employment Gain
DOE-funded National Laboratories
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL	
Projected Total Hiring	**33**	**33**	**44**	**44**	**22**	**176**	
PROJECTED EMPLOYMENT LOSS							
Retirements	0	0	0	0	33	33	
Terminations	0	0	0	0	22	22	
TOTAL	**0**	**0**	**0**	**0**	**55**	**55**	
NET EMPLOYMENT GAIN							
Projected Total Hiring	33	33	44	44	22	(176)[1]	150
Projected Total Loss	0	0	0	0	55	(55)	50
Projected Net Gain	**33**	**33**	**44**	**44**	**-33**	**(121)**	**100**

1 See rounded totals from individual tables

Table V.1

Current Employment Levels
Geoscientific Consulting Firms
(Sample, as of 12/31/87)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL
ACTIVITY						
Oil and Gas	58	0	0	9	2	69
Minerals	8	1	0		2	11
Environmental	269	28	302	340	55	994
TOTAL	**335**	**29**	**302**	**349**	**59**	**1,074**

Table V.2

Sample Projected Number of Inexperienced New Hires
Geoscientific Consulting Firms

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL
ACTIVITY						
Oil and Gas	7	0	0	0	2	9
Minerals	0	0	0	0	0	0
Environmental	31	4	43	51	8	137
TOTAL	**38**	**4**	**43**	**51**	**10**	**146**

Table V.3

Sample Projected Number of Experienced Hires
Geoscientific Consulting Firms

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL
ACTIVITY						
Oil and Gas	4	0	0	0	0	4
Minerals	2	0	0	0	0	2
Environmental	48	7	65	47	11	178
TOTAL	**54**	**7**	**65**	**47**	**11**	**184**

Table V.4

Total Projected Inexperienced New Hires
Geoscientific Consulting Firms
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL	
ACTIVITY							
Oil and Gas	52	0	0	0	15	67	
Minerals	0	0	0	0	0	0	
Environmental	231	30	321	381	60	1,023	
TOTAL	**267**	**30**	**321**	**381**	**75**	**(1,090)**	**1,100**

Table V.5

Total Projected Experienced Hires
Geoscientific Consulting Firms
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL	
ACTIVITY							
Oil and Gas	30	0	0	0	0	30	
Minerals	15	0	0	0	0	15	
Environmental	358	52	485	351	82	1,328	
TOTAL	**403**	**52**	**485**	**351**	**82**	**(1,373)**	**1,350**

Table V.6

Total Projected Hiring (Inexperienced and Experienced)
Geoscientific Consulting Firms
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL	
ACTIVITY							
Oil and Gas	82	0	0	0	15	97	
Minerals	15	0	0	0	0	15	
Environmental	589	82	806	732	142	2,351	
TOTAL	**686**	**82**	**806**	**732**	**157**	**(2,463)**	**2,450**

Table V.7

Net Employment Gain
Geoscientific Consulting Firms
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	Other Related Scientists	TOTAL	
Projected Total Hiring							
	686	82	806	732	157	2,463	
PROJECTED EMPLOYMENT LOSS							
Retirements							
	22	0	22	37	7	88	
Terminations							
	164	7	149	82	7	409	
TOTAL	**186**	**7**	**171**	**119**	**14**	**497**	
NET EMPLOYMENT GAIN							
Projected Total Hiring							
	686	82	806	732	157	(2,463)	2,450
Projected Total Loss							
	186	7	171	119	14	(497)	500
Projected Net Gain							
	500	**75**	**635**	**613**	**143**	**(1,966)**	**1,950**

Table VI.1

Current Employment Levels
Academia
(Sample, as of 12/31/87)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	TOTAL
ACADEMIC RANK					
Full Professor	384	65	23	10	482
Associate Professor	179	23	15	6	223
Assistant Professor	150	24	11	4	189
Instructor	16	3	1	0	20
Other	46	10	4	3	63
TOTAL	**775**	**125**	**54**	**23**	**977**

Table VI.2

Sample Projected Number of Inexperienced New Hires
Academia

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	TOTAL
ACADEMIC RANK					
Assistant Professor	19	5	5	0	29
Instructor	2	1	0	0	3
Other	3	0	1	2	6
TOTAL	**24**	**6**	**6**	**2**	**38**

Table VI.3

Sample Projected Number of Experienced Hires
Academia

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	TOTAL
ACADEMIC RANK					
Full Professor	5	2	3	0	10
Associate	4	6	0	0	10
Assistant Professor	19	3	2	2	26
Instructor	0	0	0	0	0
Other	2	0	1	0	3
TOTAL	**30**	**11**	**6**	**2**	**49**

Table VI.4

Total Projected New Hires
Academia
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	TOTAL
ACADEMIC RANK					
Assistant Professor	174	46	46	0	26
Instructor	18	9	0	0	27
Other	27	0	9	18	54
TOTAL	**219**	**55**	**55**	**18**	**(347) 350**

Table VI.5

Total Projected Experienced Hires
Academia
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	TOTAL	
ACADEMIC RANK						
Full Professor	46	18	27	0	91	
Associate Professor	37	55	0	0	92	
Assistant Professor	174	27	18	18	237	
Instructor	0	0	0	0	0	
Other	18	0	9	0	27	
TOTAL	**275**	**100**	**54**	**18**	**(447)**	**450**

Table VI.6

Total Projected Hiring (Inexperienced and Experienced)
Academia
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	TOTAL	
ACADEMIC RANK						
Full Professor	46	18	27	0	91	
Associate Professor	37	55	0	0	92	
Assistant Professor	348	73	64	18	503	
Instructor	18	9	0	0	27	
Other	45	0	18	18	81	
TOTAL	**494**	**155**	**109**	**36**	**(794)**	**800**

Table VI.7

Net Employment Gain
Academia
(total rounded to nearest 50)

	Geologists	Geophysicists	Hydrologists/ Hydrogeologists	Engineering Geologists	TOTAL	
PROJECTED TOTAL HIRING						
Academic Rank						
Full Professor	46	18	27	0	91	
Associate Professor	37	55	0	0	92	
Assistant	348	73	64	18	503	
Instructor	18	9	0	0	27	
Other	45	0	18	18	81	
TOTAL	**494**	**155**	**109**	**36**	**794**	
PROJECTED EMPLOYMENT LOSS						
Academic Rank						
Full Professor	138	27	0	9	174	
Associate Professor	18	0	0	0	18	
Assistant Professor	73	9	0	0	82	
Instructor	0	0	9	0	9	
Other	37	0	0	0	37	
TOTAL	**266**	**36**	**9**	**9**	**320**	
NET EMPLOYMENT GAIN						
Projected Total Hiring	494	155	109	36	(794)	800
Projected Total Loss	266	36	9	9	(320)	300
Projected Net Gain	**228**	**119**	**100**	**27**	**(474)**[1]	**500**

1 see rounded totals from individual tables

Table VII.1

Summary of Current Employment Levels and Hiring Projections for 1988

	Domestic Oil & Gas Industry	Mining/ Minerals Industry[1]	Federal/ State Government[2]	DOE-funded Nat'l Labs[3]	Geo-scientific Consulting[4]	Academia	TOTAL
Number Employed	Integ 4,828 Indep 5,670 Total 10,498	Indep 148 Integ 305 Total 453	Fed 5,210 State 633 Total 5,843	275	1,074	977	**19,120**
Number in Geosci. Pop.	38,500	11,000	14,000	3,000	8,000	9,000	**83,500**
% of Population Reported	4.1	27.3	41.7	9.2	13.4	10.9	**22.9**
Campus Hiring (Proj.)	1,350	300	800	50	1,100	350	**3,950**
Experienced Hiring (Proj.)	300	550	150	100	1,350	450	**2,900**
Total Projected Hiring	1,650	850	950	150	2,450	800	**6,850**
% of Total Hiring	24.1	12.4	13.9	2.2	35.8	11.7	**100.1**
% Increase over Current Levels	4.3	7.7	6.8	5.0	30.6	8.9	**8.2**
Number to be Lost (Proj.)	1,150	250	600	50	500	300	**2,850**
Net Gain	500	600	350	100	1,950	500	**4,000**
% of Total Gain	12.5	15.0	8.7	2.5	48.7	12.5	**99.9**
% Increase over Current Levels	1.3	5.5	2.5	3.3	24.4	5.5	**4.8**

(all projections rounded to nearest 50)

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1 Since the time of the survey mailing, several questions have arisen concerning the percentages of employment reported for some of the employer groups. Those percentages affect the hiring projections made in this report. What follows are adjustments that should be considered when evaluating the hiring projections.

There is every indication that for the mining/minerals industry, the companies surveyed represent nearly 10% of the projected hiring levels, although they account for only 4.1% of those currently employed. Projections reported here are roughly twice the number of new jobs actually available.

2 At the time of the survey, federal/state government agencies reported on their current employment levels and hiring projections prior to final provisions of the FY 1988 budget. According to Penelope Hanshaw, Deputy Chief Geologist, U.S. Geological Survey, Reston, VA, "...both budget and staff ceiling reductions are expected for FY 1988 and are projected for the next several fiscal years. The Department of the Interior is under a total hiring freeze of indefinite duration." (From "Future Employment Opportunities in the Geological Sciences," a review of presentations made at the Geological Society of America's annual meeting, Phoenix, AZ, October, 1987.) Figures concerning federal hiring of geoscientists should be interpreted accordingly.

3 For similar reasons, projected hiring for DOE-funded national laboratories may be off by a factor of 50%. However, the Department of Energy is not one of those federal agencies specifically under budget and staff reduction constraints. The projections developed in this report should be interpreted with the federal funding vagaries in mind.

4 While projections for geoscientific consulting firms seem relatively large, it is likely that federal agencies will have to increase their contracts with the private sector (e.g., geoscientific consulting firms). The reduction in federal hiring may be reflected in greater hiring levels for geoscientific consulting firms.

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Geoscientific Employment and Hiring Survey

1989

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Introduction

The Geoscientific Employment and Hiring Survey – 1989 is the second annual survey in AGI's ongoing program to examine and assess the need for and availability of geoscientists in a wide range of fields.

The hiring survey reports the results of a questionnaire sent in October 1988 to 317 companies, agencies, and universities representing the six major categories of geoscientific employers: domestic oil/gas industry, domestic mining/minerals industry, federal/state government agencies, research institutions/DOE-funded national laboratories, geoscientific consulting firms, and academia. There were 135 anonymous returns for an excellent response rate of 42.6%.

The 1989 survey has expanded its scope to include domestic research institutions (grouped with DOE-funded national laboratories) and to detail further the current and anticipated hiring levels by degree level.

For each employer category, this report contains current employment levels (as of 12/31/88), followed by levels of actual hires in 1988. Following those figures are hiring levels for inexperienced and experienced hires. Losses – due to resignations, retirements and terminations – are presented, followed by approximate starting salaries for inexperienced hires by degree level. Summary tables at the end of the report and a detailed Appendix conclude the survey.[1]

AGI gratefully acknowledges the participating employers, whose generous and detailed data are the basis of the survey, and the AGI Human Resources Advisory Committee, whose diligence has continued to guide this program successfully. AGI is also grateful to its Member Societies, whose constructive suggestions improved the final report.

AGI welcomes comments and suggestions on this program from all concerned geoscientists.

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1 In the *Geoscientific Employment and Hiring Survey – 1988*, AGI projected a total hiring level of 6,850. According to the 1989 survey, the number actually hired was 6,900 – roughly 0.7% higher. Overall, then, AGI's methodology for making projections seems reasonably sound. AGI will continue to refine its procedures to produce the greatest accuracy possible.

GEOSCIENTIFIC EMPLOYMENT AND HIRING SURVEY - 1989

I. Survey Description and Methodology

A. Survey Description

In October 1988, the American Geological Institute (AGI) sent out survey questionnaires to assess the current employment levels and anticipated 1989 hiring plans of six major categories of geoscientific employers:

- domestic oil and gas industry
- domestic mining and minerals industry
- federal and state government agencies
- research institutions and DOE-funded national laboratories
- geoscientific consulting firms
- academia

The questionnaires requested the following information:

- current employment levels (as of 12/31/88)
- the number actually hired in 1988, by degree level
- the number of inexperienced new hires anticipated to be hired in 1989, by degree level
- approximate starting salaries for new hires, by degree level
- the number of experienced geoscientists anticipated to be hired in 1989, by degree level
- the number of geoscientists expected to be lost in 1989 due to resignations, retirements and terminations.

All survey responses were returned anonymously.

Table 1 shows the response rate for each employer category:

TABLE 1

Summary of Responses to Questionnaire by Employer Category

Employer Category	Number Mailed	Number of Responses	Response Rate (%)
Domestic Oil and Gas Industry	28	12	42.9
Domestic Mining and Minerals Industry	27	8	29.6
Federal/State Government Agencies	71	38	53.5
Research Institutions/ DOE-funded National Laboratories	28	11	39.3
Geoscientific Consulting Firms	55	6	10.9
Academia	108	60	55.6
TOTAL	**317**	**135**	**42.6%**

B. Survey Methodology

1. Derivation of Projections

Responding employers provided the number of full-time current employees on their respective staffs. That number was compared to the estimated total number of employees in each employer category as described in AGI's *North American Survey of Geoscientists*. The number of employees reported in the hiring survey and the respective percentages that number represents are shown in Table 2:

TABLE 2

Number and Percentage of Total Employees

Employer Category	Number Reported Employed in Sample (12/31/88)	Total Number in Population	% of Employment Reported in Survey
Domestic Oil and Gas Industry	4,589	38,500	11.9
Domestic Mining and Minerals Industry	142	11,000	1.3
Federal and State Government Agencies	6,211	14,000	44.4
Research Institutions and DOE-funded National Laboratories	566	3,000	18.9
Geoscientific Consulting Firms	370	8,000	4.6
Academia	749	9,000	8.3
TOTAL	**12,627**	**83,500**	**15.1**

That percentage of employment reported was then applied to all actual figures that were provided by employers.

2. Terminology

Throughout this report, the term "projection" refers to AGI's projections for each survey question, as described above. Although employers also "projected" their 1989 employment and hiring levels, that type of projection is implied by the nature of the survey questions. The "actual" figures are here understood as all the raw data provided by the employers. Therefore, all "actual" (i.e., employer-provided) figures are the basis for all AGI "projections." Those "actual" data appear only in the Appendix.

The designation "geologists" includes geologists, geochemists, and other earth scientists. The designation "related professional scientists" describes those who use their non-geoscientific training or expertise for geoscientific applications, such as chemists in geochemistry laboratories and computer scientists processing geoscientific data bases.

In discussions of employment and hiring projections, two phrases are used to describe new hires:

- "inexperienced new hires" are any new hires who are hired/recruited directly from college/university campuses and who have had no previous geoscientific or geoscientific-related employment/experience.
- "experienced new hires" are any new hires who have had previous geoscientific employment or whose previous employment will be applied to geoscientific areas.

II. Analysis of Survey Results - All Employer Categories

A. Analysis of Current Employment Levels

1. Current Levels by Employer Category and Degree Level

Employers provided their current employment levels (as of 12/31/88) according to degree level. Table 3 presents those results[1]:

TABLE 3

Current Employment Levels (as of 12/31/88)
By Employer Category and Degree Level

	Degree Level				
Employer Category	**BA/BS**	**MA/MS**	**PhD**	**Total**	**% of Total**
Domestic Oil and Gas Industry	11,421	21,446	5,697	38,564	46.3
Domestic Mining and Minerals Industry	3,924	6,154	846	10,924	13.1
Federal/State Government Agencies	6,040	4,239	3,703	13,982	16.8
Research Institutions/ DOE-funded National Laboratories	459	633	1,720	2,812	3.4
Geoscientific Consulting Firms	2,327	4,328	1,392	8,047	9.7
Academia	301	482	8,239	9,022	10.8
TOTAL	**24,472**	**37,282**	**21,597**	**83,351**	**100.1**[2]

Table 4 and Figure A present these data as percentages by degree level for each employer category:

TABLE 4

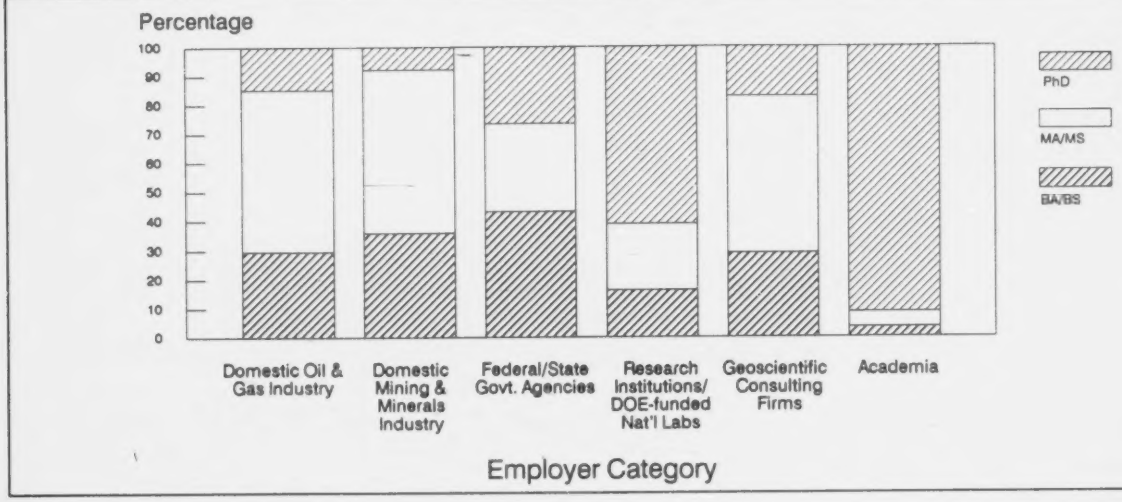
Current Employment Levels
by Employer Category and Degree Level
(as percentage for each employer category)

	Degree Level			
Employer Category	**% BA/BS**	**% MA/MS**	**% PhD**	**Total**
Domestic Oil and Gas Industry	29.6	55.6	14.8	100.0
Domestic Mining and Minerals Industry	35.9	56.3	7.7	99.9
Federal/State Government Agencies	43.2	30.3	26.5	100.0
Research Institutions/ DOE-funded National Laboratories	16.3	22.5	61.2	100.0
Geoscientific Consulting Firms	28.9	53.8	17.3	100.0
Academia	3.3	5.3	91.3	99.9
TOTAL	**29.4**	**44.7**	**25.9**	**100.0**

1 All figures presented in the main text of this survey are the projections derived from the actual data received from the respondents. The "sample" (actual) figures are contained in the Appendix.

2 Totals do not always sum to 100.0% due to rounding.

Figure A
Current Employment Levels
By Employer Category and Degree Level



2. Current Levels by Occupational Category and Degree Level

Current employment levels were also provided for occupational category and degree level, as shown in Table 5:

TABLE 5

Current Employment Levels (as of 12/31/88)
By Occupational Category and Degree Level

	Degree Level				
Occupational Category	**BA/BS**	**MA/MS**	**PhD**	**Total**	**% of Total**
Geologists	11,437	22,823	14,245	48,505	58.2
Geophysicists	4,157	6,317	3,273	13,747	16.5
Hydrologists/Hydrogeologists	3,719	3,522	1,284	8,525	10.2
Engineering Geologists	666	1,915	187	2,768	3.3
Related Professional Scientists	4,493	2,705	2,608	9,806	11.8
TOTAL	**24,472**	**37,282**	**21,597**	**83,351**	**100.0**

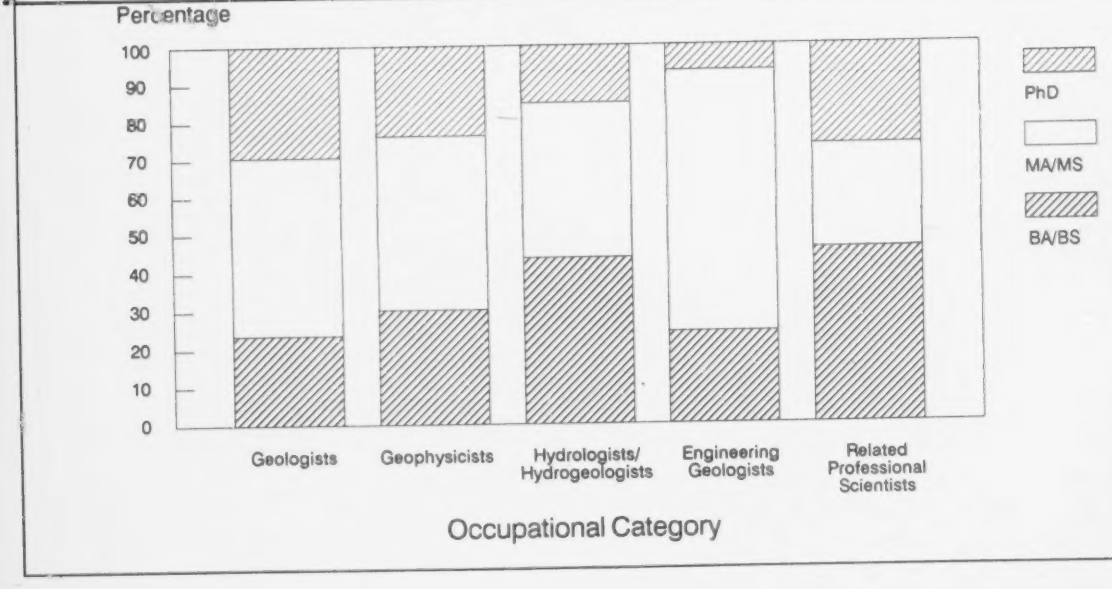
Table 6 and Figure B show these data as percentages by degree level for each occupational category:

TABLE 6

Current Employment Levels
by Occupational Category and Degree Level
(as percentage for each occupational category)

	Degree Level			
Occupational Category	**% BA/BS**	**% MA/MS**	**% PhD**	**Total**
Geologists	23.6	47.1	29.4	100.1
Geophysicists	30.2	46.0	23.8	100.0
Hydrologists/Hydrogeologists	43.6	41.3	15.1	100.0
Engineering Geologists	24.1	69.2	6.7	100.0
Related Professional Scientists	45.8	27.6	26.6	100.0
TOTAL	**29.4**	**44.7**	**25.9**	**100.0**

Figure B
Current Employment Levels
By Occupational Category and Degree Level



B. Analysis of 1988 Hiring Levels

1. 1988 Hiring by Employer Category and Degree Level

Survey respondents provided the numbers of actual hires in 1988, by degree level and by occupational category. Table 7 shows these data by employer category:

TABLE 7

Number Actually Hired in 1988 by Employer Category and Degree Level

	Degree Level				
Employer Category	**BA/BS**	**MA/MS**	**PhD**	**Total**	**% of Total**
Domestic Oil and Gas Industry	259	1,539	260	2,058	29.8
Domestic Mining and Minerals Industry	308	923	231	1,462	21.2
Federal/State Government Agencies	338	237	121	696	10.1
Research Institutions/ DOE-funded National Laboratories	76	59	100	235	3.4
Geoscientific Consulting Firms	262	654	44	960	13.9
Academia	133	156	1,203	1,492	21.6
TOTAL	**1,376**	**3,568**	**1,959**	**6,903**	**100.0**

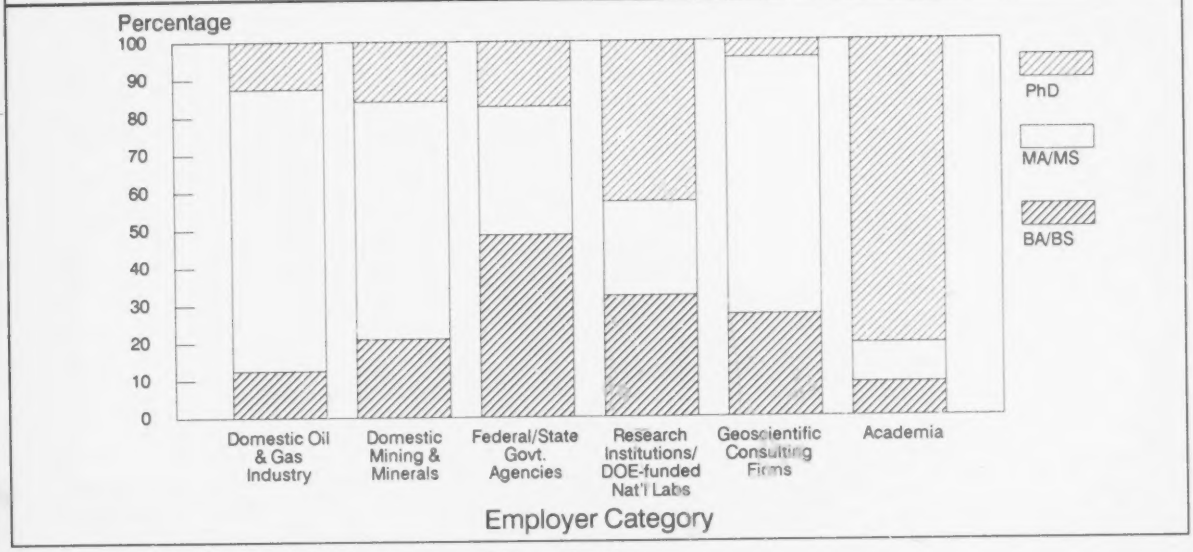
Table 8 and Figure C present these data as percentages by degree level for each employer category:

TABLE 8

Number Actually Hired in 1988 By Employer Category and Degree Level (as percentage for each employer category)

Employer Category	**% BA/BS**	**% MA/MS**	**% PhD**	**Total**
Domestic Oil and Gas Industry	12.6	74.8	12.6	100.0
Domestic Mining and Minerals Industry	21.1	63.1	15.8	100.0
Federal/State Government Agencies	48.6	34.1	17.4	100.1
Research Institutions/ DOE-funded National Laboratories	32.3	25.1	42.6	100.0
Geoscientific Consulting Firms	27.3	68.1	4.6	100.0
Academia	8.9	10.5	80.6	100.0
TOTAL	**19.9**	**51.7**	**28.4**	**100.0**

Figure C
Numbers Actually Hired in 1988
By Employer Category and Degree Level



2. 1988 Hiring by Occupational Category and Degree Level

Table 9 presents the number actually hired in 1988 by occupational category and degree level:

TABLE 9

Number Actually Hired in 1988
by Occupational Category and Degree Level

	Degree Level				
Occupational Category	**BA/BS**	**MA/MS**	**PhD**	**Total**	**% of Total**
Geologists	744	2,005	1,390	4,139	60.0
Geophysicists	89	732	266	1,087	15.8
Hydrologists/Hydrogeologists	262	446	193	901	13.0
Engineering Geologists	44	284	12	340	4.9
Related Professional Scientists	237	101	98	436	6.3
TOTAL	**1,376**	**3,568**	**1,959**	**6,903**	**100.0**

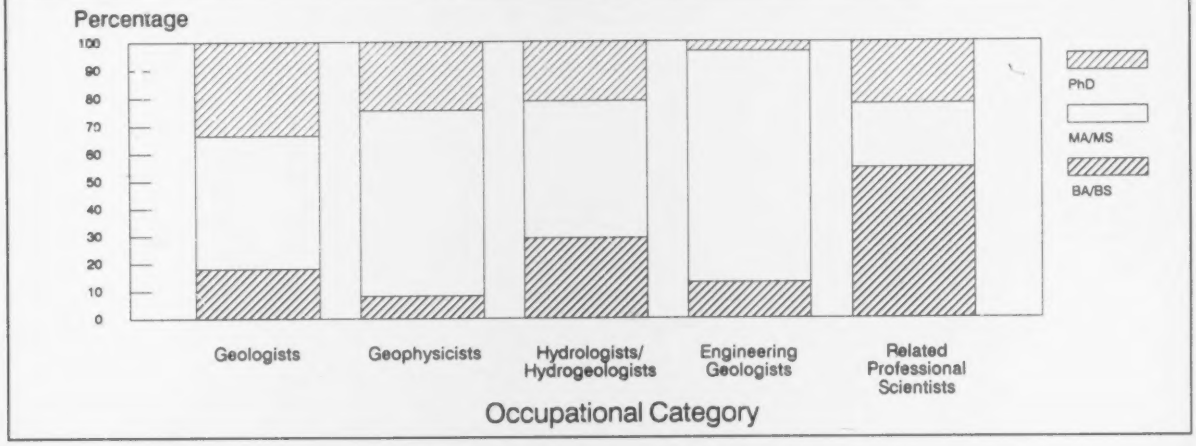
Table 10 and Figure D show these data as percentages by degree level for each occupational category:

TABLE 10

Number Actually Hired in 1988
by Occupational Category and Degree Level
(as percentage for each occupational category)

Occupational Category	**% BA/BS**	**% MA/MS**	**% PhD**	**Total**
Geologists	18.0	48.4	33.6	100.0
Geophysicists	8.2	67.3	24.5	100.0
Hydrologists/Hydrogeologists	29.1	49.5	21.4	100.0
Engineering Geologists	12.9	83.5	3.5	99.9
Related Professional Scientists	54.4	23.2	22.5	100.1
TOTAL	**19.9**	**51.7**	**28.4**	**100.0**

Figure D
Number Actually Hired in 1988
by Occupational Category and Degree Level



C. Projected Hiring Levels for All Employer Categories

1. 1989 Hiring Levels by Occupational Category and Employer Category

Table 11 and Figure E present a summary of projected hiring for 1989 by occupational category and geoscientific employer:

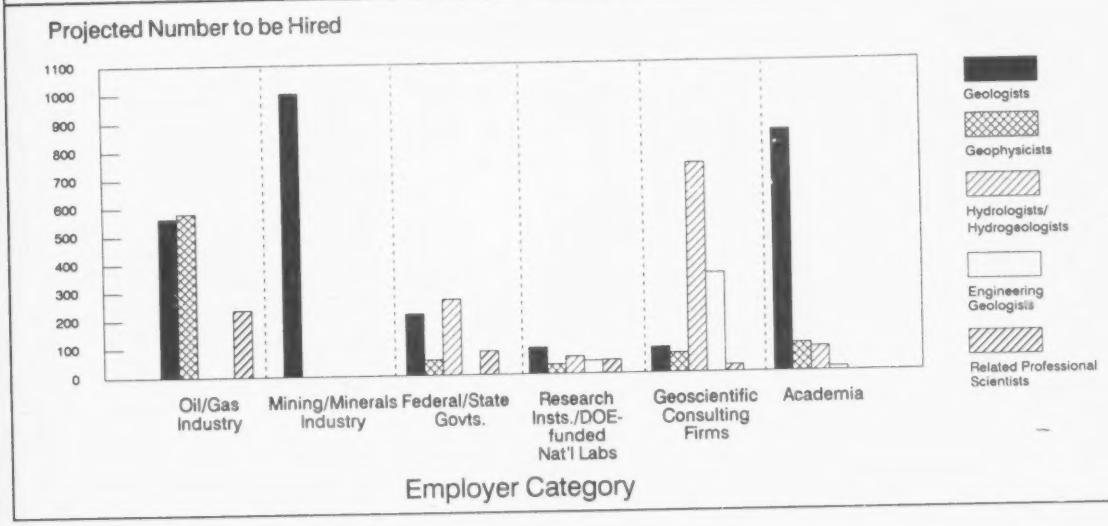
TABLE 11

Summary of Projected Hiring Levels for 1989
by Occupational Category and Employer Category

Occupational Category	Oil/Gas Industry	Mining/ Minerals Industry	Federal/ State Govts	Research Insts/ DOE-Funded National Labs	Geoscientific Consulting Firms	Academia	TOTAL	% of Total
	Employer Category							
Geologists	562	1,001	216	91	88	855	2,813	50.5
Geophysicists	579	0	53	32	66	96	826	14.8
Hydrologists/ Hydrogeologists	0	0	265	58	740	84	1,147	20.6
Engineering Geologists	0	0	0	43	347	12	402	7.2
Related Professional Scientists	235	0	81	45	22	0	383	6.9
TOTAL	(1,376)	(1,001)	(615)	(269)	(1,263)	(1,047)	(5,571)	(100.0)
	1,400 [1]	**1,000**	**600**	**250**	**1,250**	**1,050**	**5,550**	
% Increase over Current Employment	**3.6**	**9.1**	**4.3**	**8.3**	**15.6**	**11.7**	**6.6**	
% of Total Hiring	**25.2**	**18.0**	**10.8**	**4.5**	**22.5**	**18.9**	**99.9**	

1 All totals are rounded to nearest 50.

Figure E
Summary of Projected Hiring Levels for 1989
By Occupational Category and Employer Category



2. 1989 Hiring Levels by Employer Category and Degree Level

Table 12 shows the projected hiring levels for 1989 by employer category and degree level:

TABLE 12

Projected Hiring Levels for 1989
by Employer Category and Degree Level

	Degree Level				
Employer Category	**BA/BS**	**MA/MS**	**PhD**	**Total**	**% of Total**
Domestic Oil and Gas Industry	176	1,108	92	1,376	24.7
Domestic Mining and Minerals Industry	231	770	0	1,001	18.0
Federal/State Government Agencies	269	251	95	615	11.0
Research Institutions/ DOE-funded National Laboratories	35	74	160	269	4.8
Geoscientific Consulting Firms	44	1,065	154	1,263	22.7
Academia	169	96	782	1,047	18.8
TOTAL	(924)	(3,364)	(1,283)	(5,571)	(100.0)
	900	**3,350**	**1,300**	**5,550**	

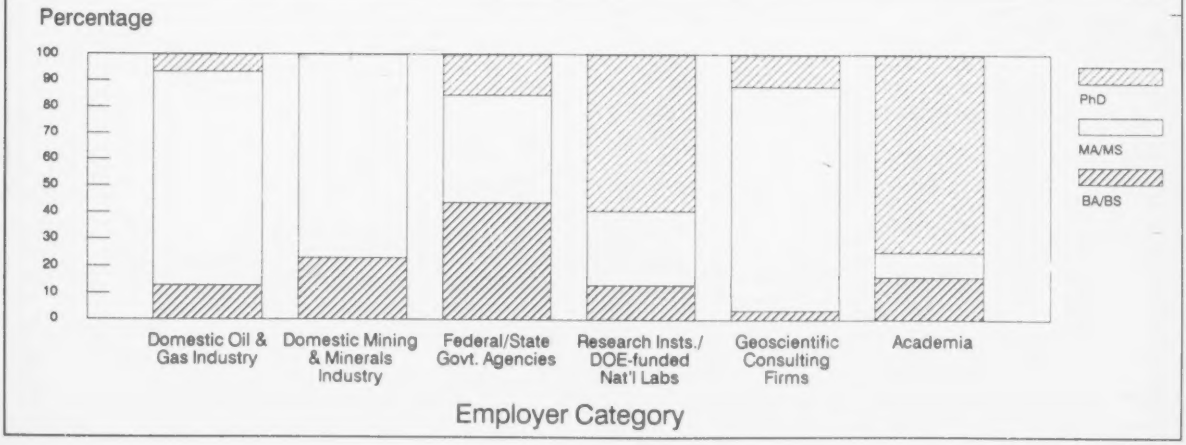
Table 13 and Figure F present these data as percentages of hires for each employer category:

TABLE 13

Projected Hiring Levels for 1989
by Employer Category and Degree Level
(as percentage for each employer category)

	Degree Level			
Employer Category	**% BA/BS**	**% MA/MS**	**% PhD**	**Total**
Domestic Oil and Gas Industry	12.8	80.5	6.7	100.0
Domestic Mining and Minerals Industry	23.1	76.9	0.0	100.0
Federal/State Government Agencies	43.7	40.8	15.5	100.0
Research Institutions/ DOE-funded National Laboratories	13.0	27.5	59.5	100.0
Geoscientific Consulting Firms	3.5	84.3	12.2	100.0
Academia	16.1	9.2	74.7	100.0
TOTAL	**16.6**	**60.4**	**23.0**	**100.0**

Figure F
Projected Hiring Levels for 1989
by Employer Category and Degree Level



3. 1989 Hiring Levels by Occupational Category and Degree Level

The projected hiring levels for 1989 by occupational category and degree level are shown in Table 14:

TABLE 14

Projected Hiring for 1989
by Occupational Category and Degree Level

	Degree Level				
Occupational Category	**BA/BS**	**MA/MS**	**PhD**	**Total**	**% of Total**
Geologists	521	1,425	867	2,813	50.5
Geophysicists	93	571	162	826	14.8
Hydrologists/Hydrogeologists	135	804	208	1,147	20.6
Engineering Geologists	0	374	28	402	7.2
Related Professional Scientists	175	190	18	383	6.9
TOTAL	(924)	(3,364)	(1,283)	(5,571)	(100.0)
	900	**3,350**	**1,300**	**5,550**	

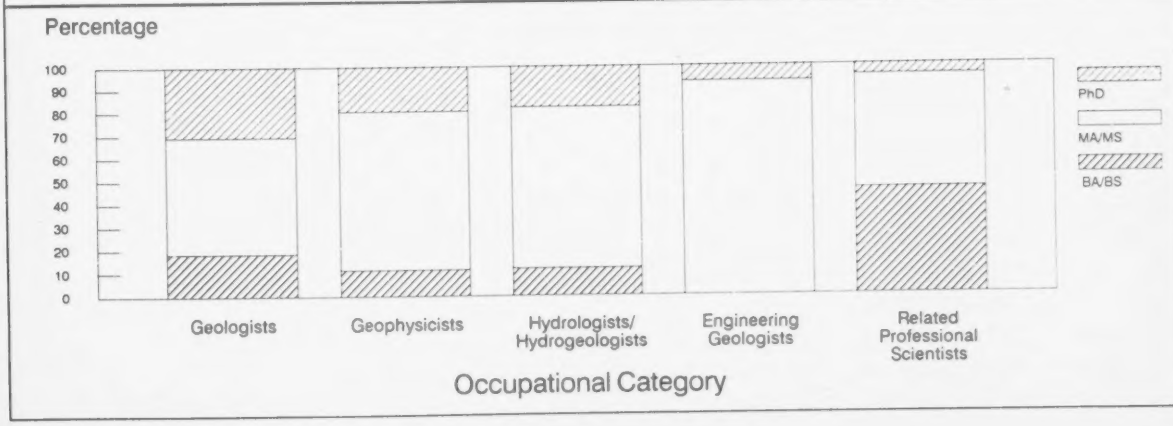
Table 15 and Figure G present these numbers as percentages of projected hiring by occupational category and degree level:

TABLE 15

Projected Hiring for 1989
by Occupational Category and Degree Level
(as percentage for each occupational category)

	Degree Level			
Occupational Category	**% BA/BS**	**% MA/MS**	**% PhD**	**Total**
Geologists	18.5	50.7	30.8	100.0
Geophysicists	11.3	69.1	19.6	100.0
Hydrologists/Hydrogeologists	11.8	70.1	18.1	100.0
Engineering Geologists	0.0	93.0	7.0	100.0
Related Professional Scientists	45.7	49.6	4.7	100.0
TOTAL	**16.6**	**60.4**	**23.0**	**100.0**

Figure G
Projected Hiring for 1989
By Occupational Category and Degree Level



D. Comparison Between 1988 Actual Hiring Levels and Projected 1989 Hiring Levels

1. Comparison by Employer Category and Degree Level

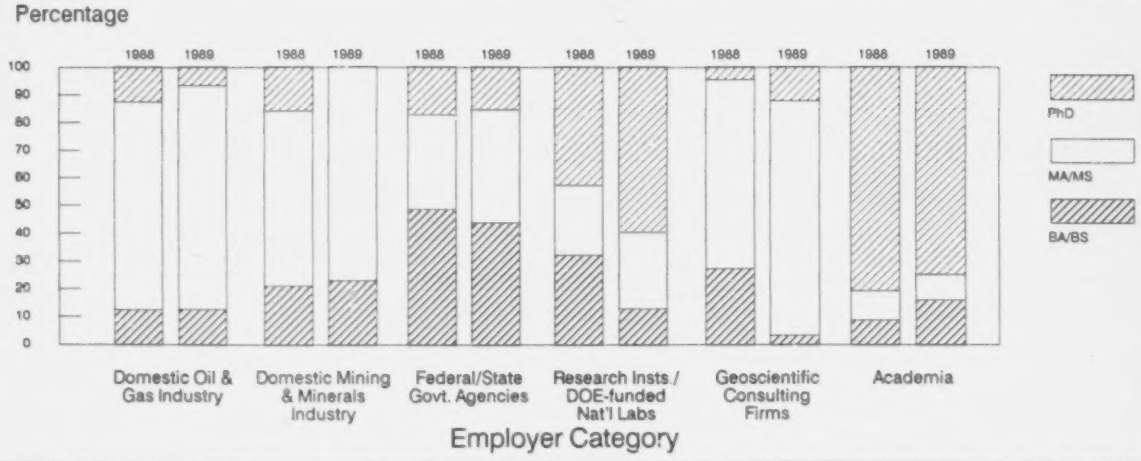
It is instructive to compare the percentages by degree level of 1988 actual hires and 1989 projected hires. That comparison is shown for each employer category in Table 16 and Figure H:

TABLE 16

Comparison by Degree Level of 1988 Actual Hires and 1989 Projected Hires for Each Employer Category (as percentage for each employer category)

	% BA/BS		% MA/MS		% PhD	
Employer Category	**1988**	**1989**	**1988**	**1989**	**1988**	**1989**
Domestic Oil and Gas Industry	12.6	12.8	74.8	80.5	12.6	6.7
Domestic Mining and Minerals Industry	21.1	23.1	63.1	76.9	15.8	0.0
Federal/State Government Agencies	48.6	43.7	34.1	40.8	17.4	15.5
Research Institutions/ DOE-funded National Laboratories	32.3	13.0	25.1	27.5	42.6	59.5
Geoscientific Consulting Firms	27.3	3.5	68.1	84.3	4.6	12.2
Academia	8.9	16.1	10.5	9.2	80.6	74.7

Figure H
Comparison by Degree Level of 1988 Hires and 1989 Projected Hires for Each Employer Category (as percentage for each employer category)



2. Comparison by Occupational Category and Degree Level

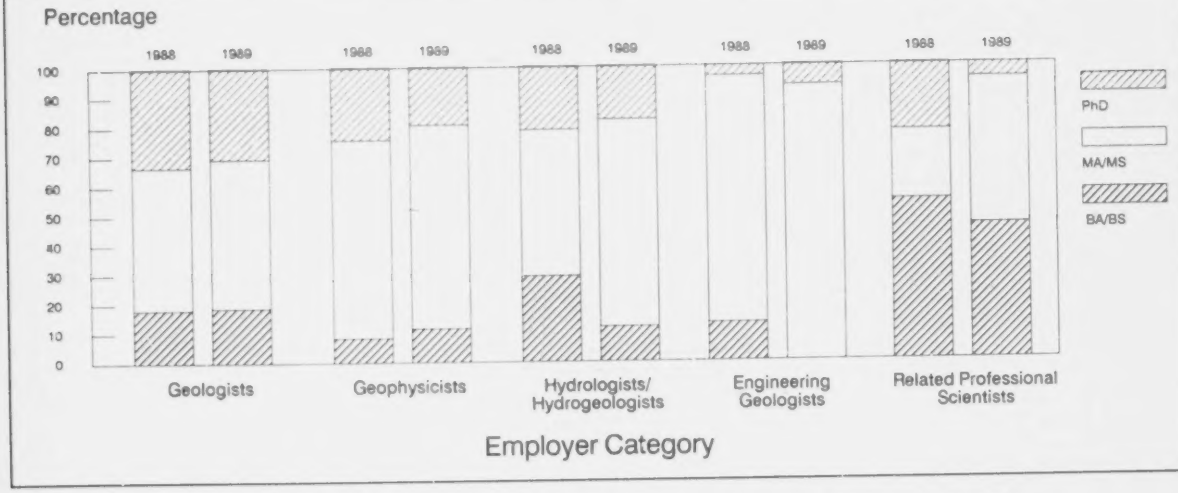
Table 17 and Figure J show a similar comparison between 1988 actual hires and 1989 projected hires by degree level for each occupational category:

TABLE 17

Comparison Between 1988 Actual Hires and 1989 Projected Hires by Degree Level for Each Occupational Category

	% BA/BS		% MA/MS		% PhD	
Occupational Category	**1988**	**1989**	**1988**	**1989**	**1988**	**1989**
Geologists	18.0	18.5	48.4	50.7	33.6	30.8
Geophysicists	8.2	11.3	67.3	69.1	24.5	19.6
Hydrologists/Hydrogeologists	29.1	11.8	49.5	70.1	21.4	18.1
Engineering Geologists	12.9	0.0	83.5	93.0	3.5	7.0
Related Professional Scientists	54.4	45.7	23.2	49.6	22.5	4.7

Figure J
Comparison Between 1988 Actual Hires and 1989 Projected Hires by Degree Level for Each Occupational Category



Based on the comparison by degree level between 1988 and 1989 hiring, there are several noteworthy trends.

- At the BA/BS level: hiring will nearly double in 1989 in academia, while geoscientific consulting and research institutions/DOE-funded national laboratories will decrease sharply their bachelor's-level hiring.
- At the MA/MS level: except for academia, hiring in 1989 will increase across the board. The largest increases will be in geoscientific consulting and in the mining/minerals industry.
- At the PhD level: PhD-level hiring will increase in research institutions/DOE-funded national laboratories (16.9%) and in geoscientific consulting (7.6%). All other employers will cut back on PhD-level hiring, with the mining/minerals industry showing the largest decrease (-15.8%), followed by the oil/gas industry and academia (both -5.9%) and federal/state government agencies (-1.9%).

By occupational category, hiring of bachelor's-level geologists and geophysicists will increase slightly. All other occupations will show a decrease, the greatest drop being for hydrologists/hydrogeologists (-17.3%) and engineering geologists (-12.9%).

All occupational categories will show increases in hiring at the master's-level: related professional scientists will be up 26.4%, followed by hydrologists/hydrogeologists (up 20.6%), engineering geologists (up 9.5%), geologists (up 2.7%) and geophysicists (up 1.8%).

Except for engineering geologists, who will show a 3.5% increase in PhD-level hiring, all other occupations will reflect a decrease in their doctoral hiring: related professional scientists (down 17.8%), geophysicists (down 4.9%), hydrologists/ hydrogeologists (down 3.3%) and geologists (down 2.8%).

Those trends indicate the increased importance of a master's degree as a prerequisite for professional-level geoscientific employment. The consequent devaluation of bachelor's degrees reinforces the trend toward higher educational requirements.

E. Summary of 1989 Hiring for Each Employer Category

1. Domestic Oil and Gas Industry

Of the 1,376 projected total hires for the domestic oil and gas industry, 75.1% will be inexperienced new hires and 24.9% will be experienced hires. Of the inexperienced new hires, 85.4% will have master's degrees; of the experienced new hires, 65.9% will have master's degrees. For the overall total hires, 80.5% will have master's degrees.

By occupational category, 40.8% of the total new hires will be geologists, 42.1% will be geophysicists, and 17.1% will be related professional scientists. Of the new geologists, 83.6% will have master's degrees, as will 84.1% of the new geophysicists, and 64.3% of the new related professional scientists.

2. Domestic Mining and Minerals Industry

Of the 1,001 projected total hires for the domestic mining and minerals industry, 53.8% will be inexperienced and 46.2% will be experienced. Of the inexperienced new hires, 71.4% will have master's degrees, as will 83.3% of the experienced hires.

All new hires (inexperienced and experienced) will be geologists, of whom 76.9% will have master's degrees.

3. Federal and State Government Agencies

a. Federal Government Agencies

Federal government agencies will hire 473 new personnel, of whom 35.3% will be inexperienced and 64.7% experienced. Of the inexperienced hires, 45.5% will have master's degrees, as will 37.9% of the experienced hires.

By occupational category, 25.8% of the total new hires will be geologists, 10.8% will be geophysicists, 49.7% will be hydrologists/hydrogeologists, and 13.7% will be related professional scientists.

b. State Government Agencies

State government agencies will hire 142 new geoscientists, in the proportions of 31.0% inexperienced and 69.0% experienced. Of the inexperienced hires, 45.5% will have master's degrees, as will 36.7% of the experienced hires.

By occupational category, 66.2% of the total new hires will be geologists, 1.4% will be geophysicists, 21.1% will be hydrologists/hydrogeologists, and 11.3% related professional scientists.

4. Research Institutions and DOE-funded National Laboratories

a. Research Institutions

All of the 55 total projected new hires in research institutions will be inexperienced, and 18.2% will have master's degrees.

Research institutions will hire only geologists (45.5%) and related professional scientists (54.5%).

b. DOE-funded National Laboratories

Of the 214 total projected new hires for national laboratories, 57.5% will be inexperienced and 42.5% will be experienced. Of the inexperienced hires, 30.1% will have master's degrees, as will 29.7% of the experienced hires.

By occupational category, 30.8% of the total new hires will be geologists, 15.0% will be geophysicists, 27.1% will be hydrologists/hydrogeologists, 20.1% will be engineering geologists, and 7.0% will be related professional scientists.

5. Geoscientific Consulting Firms

Of the 1,263 projected total hires for geoscientific consulting firms, 63.8% will be inexperienced and 36.2% will be experienced. Of the inexperienced hires, 86.4% will have master's degrees, while 80.7% of the experienced hires will have master's degrees.

By occupational category, 7.0% of the total new hires will be geologists, 5.2% will be geophysicists, 58.6% will be hydrologists/hydrogeologists, 27.5% will be engineering geologists, and 1.7% will be related professional scientists.

6. Academia

Of the 1,047 projected total hires for academia, 66.7% will be inexperienced and 33.3% will be experienced. Of the inexperienced new hires, 68.9% will have doctoral degrees, as will 86.2% of the experienced new hires.

By occupational category, 81.7% of the total new hires will be geologists, 9.2% will be geophysicists, 8.0% will be hydrologists/hydrogeologists, and 1.1% will be engineering geologists.

III. RESULTS FOR EACH EMPLOYER CATEGORY

A. Domestic Oil and Gas Industry

Appendix, Tables I.A-F

1. Current Employment Levels

Respondents in this employer category indicated their company size in terms of the number of geoscientists employed. Of the 12 companies responding, 3 had less than 100 geoscientific employees, 4 companies had between 200 and 300, and 5 had more than 300. The range of surveyed companies responding, in other words, seemed representative of the industry.

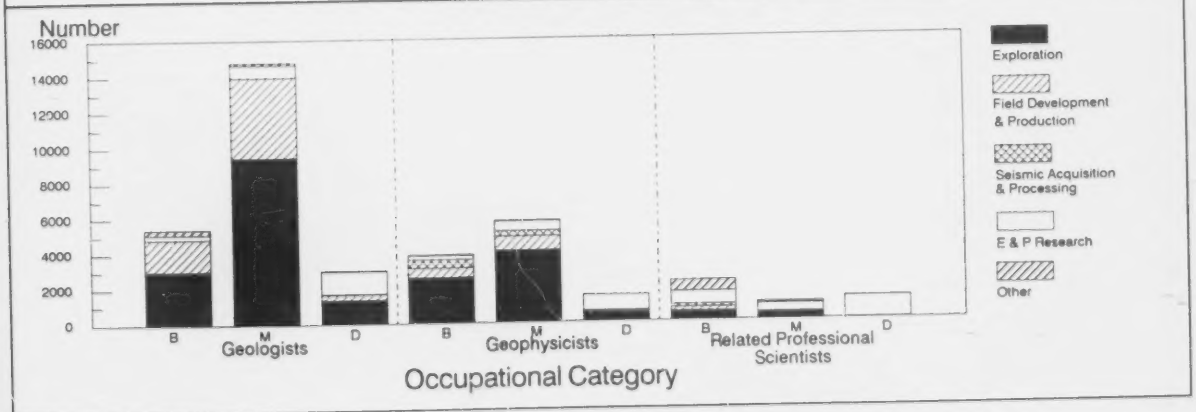
Table 18 and Figure K show the projected current employment levels (as of 12/31/88) by occupational objective, occupational category, and degree level:

TABLE 18

Current Employment Levels
by Occupational Objective, Occupational Category, and Degree Level
Domestic Oil and Gas Industry

	Occupational Category													
	Geologists[1]			Geophysicists			Related Professional Scientists[2]			Totals				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	TOTAL	% OF TOTAL
Exploration	3,034	9,429	1,336	2,580	4,059	429	479	345	25	6,093	13,833	1,790	21,716	56.3
Field Development & Production	1,798	4,487	328	521	781	109	235	8	0	2,554	5,276	437	8,267	21.4
Seismic Acquisition & Processing	0	25	8	462	328	34	143	42	8	605	395	50	1,050	2.7
E & P Research	261	681	1,294	261	538	899	723	471	1,202	1,245	1,690	3,395	6,330	16.4
Other	269	143	17	8	25	8	647	84	0	924	252	25	1,201	3.1
Total	**5,362**	**14,765**	**2,983**	**3,832**	**5,731**	**1,479**	**2,227**	**950**	**1,235**	**11,421**	**21,446**	**5,697**	**38,564**	**99.9**
			23,110			**11,042**			**4,412**					

Figure K
Current Employment Levels
by Occupational Objective, Occupational Category, and Degree Level
Domestic Oil and Gas Industry



1 Includes Geochemists

2 e.g., Computer Scientists processing geoscience data, chemists in geochemistry labs, etc.

2. Number Hired in 1988

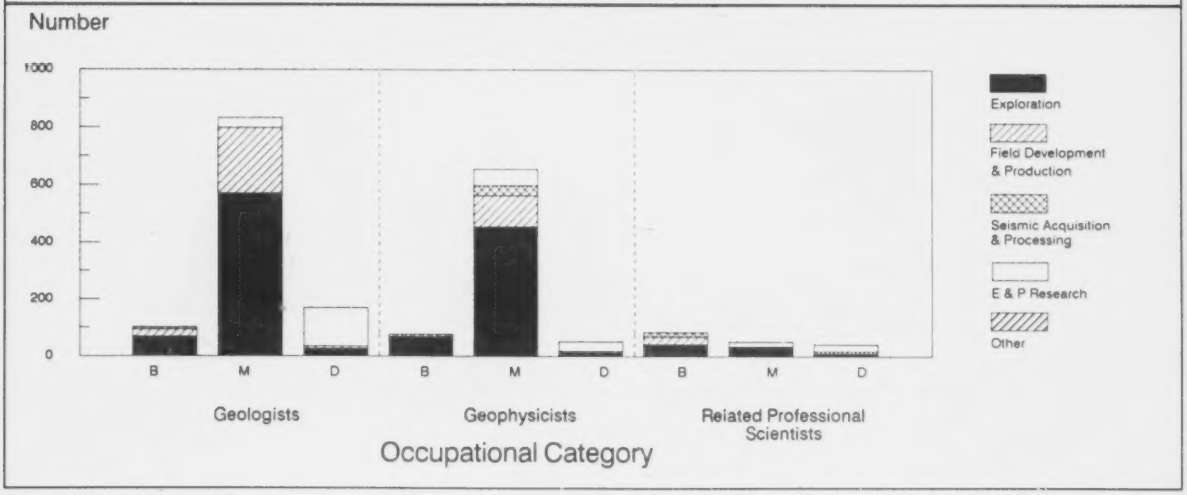
Employers provided the number of geoscientists actually hired in 1988, as shown in Table 19 and Figure L:

TABLE 19

Number of Geoscientists Actually Hired in 1988
By Occupational Objective, Occupational Category, and Degree Level
Domestic Oil and Gas Industry

	Occupational Category													
	Geologists			Geophysicists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	TOTAL	% OF TOTAL
Exploration	67	571	25	67	454	17	42	34	8	176	1,059	50	1,285	62.4
Field Development & Production	25	227	8	0	109	0	25	0	0	50	336	8	394	19.1
Seismic Acquisition & Processing	0	0	0	8	34	0	17	0	8	25	34	8	67	3.3
E & P Research	0	34	135	0	59	34	0	17	25	0	110	194	304	14.8
Other	8	0	0	0	0	0	0	0	0	8	0	0	8	0.4
Total	**100**	**832**	**168**	**75**	**656**	**51**	**84**	**51**	**41**	**259**	**1,539**	**260**	**2,058**	**100.0**
			1,100			**782**			**176**					

Figure L
Number of Geoscientists Actually Hired in 1988
by Occupational Objective, Occupational Category, and Degree Level
Domestic Oil and Gas Industry



3. Projected Hiring for 1989

Employers provided the number of expected hires for 1989. Those estimates project the number of new hires (i.e., those to be hired directly from colleges/universities) and experienced hires. Table 20 shows projections for new hires, by occupational objective, occupational category, and degree level:

TABLE 20

Projected New (Inexperienced) Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Domestic Oil and Gas Industry

	Occupational Category													
	Geologists			Geophysicists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	TOTAL	% OF TOTAL
Exploration	0	244	17	42	277	8	17	17	0	59	538	25	622	60.2
Field Development & Production	0	109	0	0	84	0	0	0	0	0	193	0	193	18.7
Seismic Acquisition & Processing	0	0	0	8	42	0	0	84	0	8	126	0	134	13.0
E & P Research	0	8	42	0	17	17	0	0	0	0	25	59	84	8.1
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**0**	**361**	**59**	**50**	**420**	**25**	**17**	**101**	**0**	**67**	**882**	**84**	**1,033**	**100.0**
			420			**495**			**118**					

Table 21 shows projected 1989 hiring for experienced geoscientists:

TABLE 21

Projected Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Domestic Oil and Gas Industry

	Occupational Category													
	Geologists			Geophysicists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	TOTAL	% OF TOTAL
Exploration	25	42	8	17	42	0	8	0	0	50	84	8	142	41.4
Field Development & Production	0	42	0	0	25	0	0	0	0	0	67	0	67	19.5
Seismic Acquisition & Processing	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
E & P Research	0	17	0	0	0	0	0	0	0	0	17	0	17	5.0
Other	0	8	0	0	0	0	59	50	0	59	58	0	117	34.1
Total	**25**	**109**	**8**	**17**	**67**	**0**	**67**	**50**	**0**	**109**	**226**	**8**	**343**	**100.0**
			142			**84**			**117**					

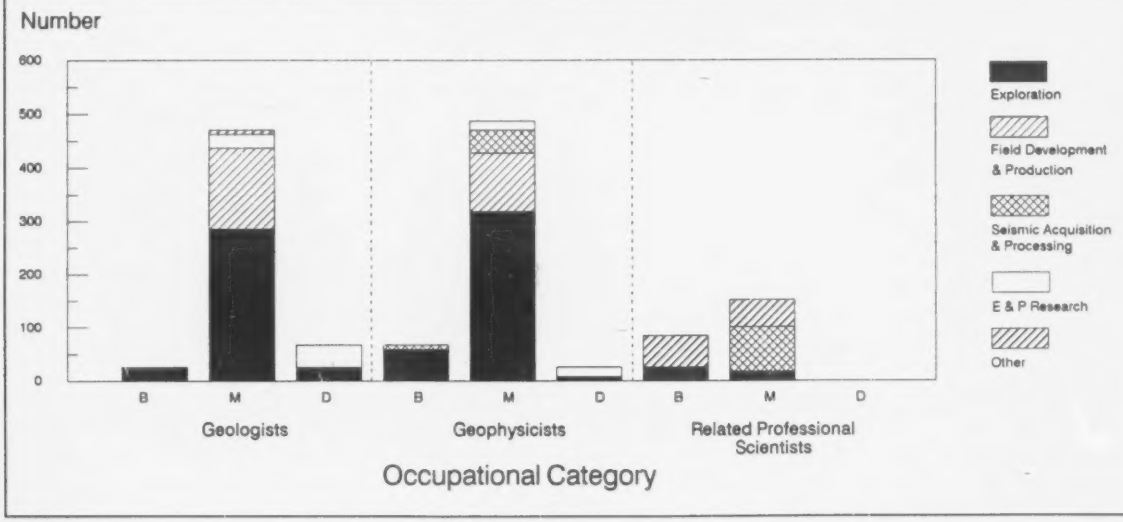
Table 22 and Figure M present the total projected hiring (inexperienced and experienced) for 1989 for the domestic oil and gas industry:

TABLE 22

Projected New (Inexperienced) and Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Domestic Oil and Gas Industry

	Occupational Category													
	Geologists			Geophysicists			Related Professional Scientists			TOTALS				
Occupational Objective	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**TOTAL**	**% OF TOTAL**
Exploration	25	286	25	59	319	8	25	17	0	109	622	33	764	55.5
Field Development & Production	0	151	0	0	109	0	0	0	0	0	260	0	260	18.9
Seismic Acquisition & Processing	0	0	0	8	42	0	0	84	0	8	126	0	134	9.7
E & P Research	0	25	42	0	17	17	0	0	0	0	42	59	101	7.3
Other	0	8	0	0	0	0	59	50	0	59	58	0	117	8.5
Total	**25**	**470**	**67**	**67**	**487**	**25**	**84**	**151**	**0**	**176**	**1,108**	**92**	**1,376**	**99.9**
			562			579			235					

Figure M
Projected Total Hires for 1989
by Occupational Objective, Occupational Category, and Degree Level
Domestic Oil and Gas Industry



4. Projected Losses for 1989

Table 23 presents the number expected to be lost in 1989, due to resignations, retirements, and terminations:

TABLE 23

Projected Losses for 1989
By Occupational Category and Degree Level
Domestic Oil and Gas Industry

	Occupational Category													
	Geologists			Geophysicists			Related Professional Scientists			TOTALS				
Reason for Loss	B	M	D	B	M	D	B	M	D	B	M	D	TOTAL	% OF TOTAL
Resignations	160	437	50	67	210	25	101	59	17	328	706	92	1,126	65.4
Retirements	92	143	17	76	59	8	8	0	0	176	202	25	403	23.4
Terminations	25	67	0	34	59	0	8	0	0	67	126	0	193	11.2
Total	**277**	**647**	**67**	**177**	**328**	**33**	**117**	**59**	**17**	**571**	**1,034**	**117**	**1,722**	**100.0**
			991			538			193					

5. Net Gain/Loss in Employment

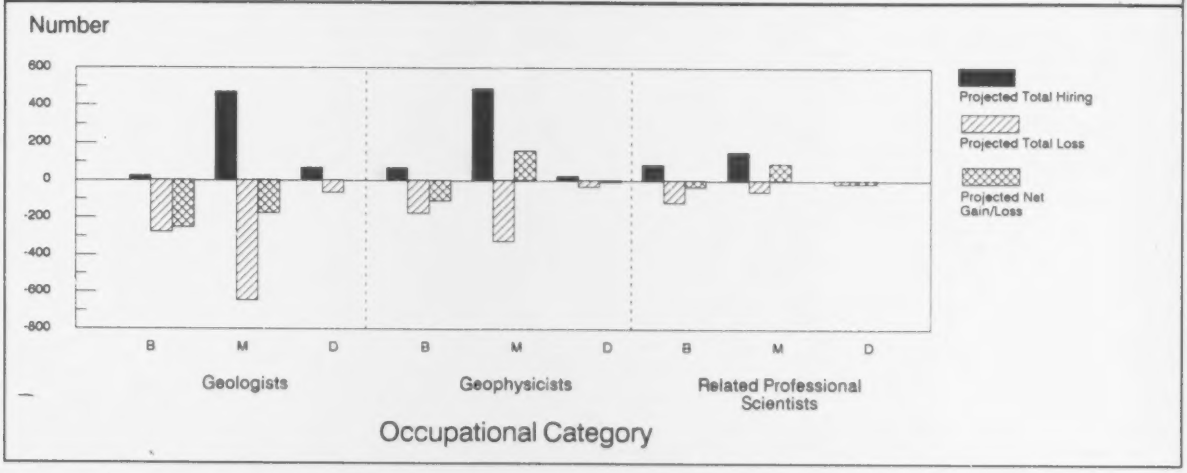
The difference between the projected total hiring and the projected total employment loss provides the net gain. Table 24 and Figure N present the net gain/loss for the domestic oil and gas industry:

TABLE 24

Projected Net Gain/Loss in Employment
Domestic Oil and Gas Industry

	Occupational Category												
	Geologists			Geophysicists			Related Professional Scientists			TOTALS			
	B	M	D	B	M	D	B	M	D	B	M	D	TOTAL
Projected Total Hiring	25	470	67	67	487	25	84	151	0	176	1,108	92	1,376
Projected Total Loss	277	647	67	177	328	33	117	59	17	571	1,034	117	1,722
Projected Net Gain/Loss	**-252**	**-177**	**0**	**-110**	**159**	**-8**	**-33**	**92**	**-17**	**-395**	**74**	**-25**	**-346**

Figure N
Projected Net Gain/Loss in Employment
by Occupational Category and Degree Level
Domestic Oil and Gas Industry



6. Approximate Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires by degree level are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$31,250
MA/MS	$33,571
PhD	$39,375

B. Domestic Mining and Minerals Industry

Appendix, Tables II.A-F

1. Current Employment Levels

Respondents in this employer category indicated if they were independent minerals producers or integrated minerals/energy resource companies. Of the 8 companies responding, 3 were independent minerals producers and 5 were integrated minerals/energy resource companies. The data presented in this section represent the combined results for both types of companies.

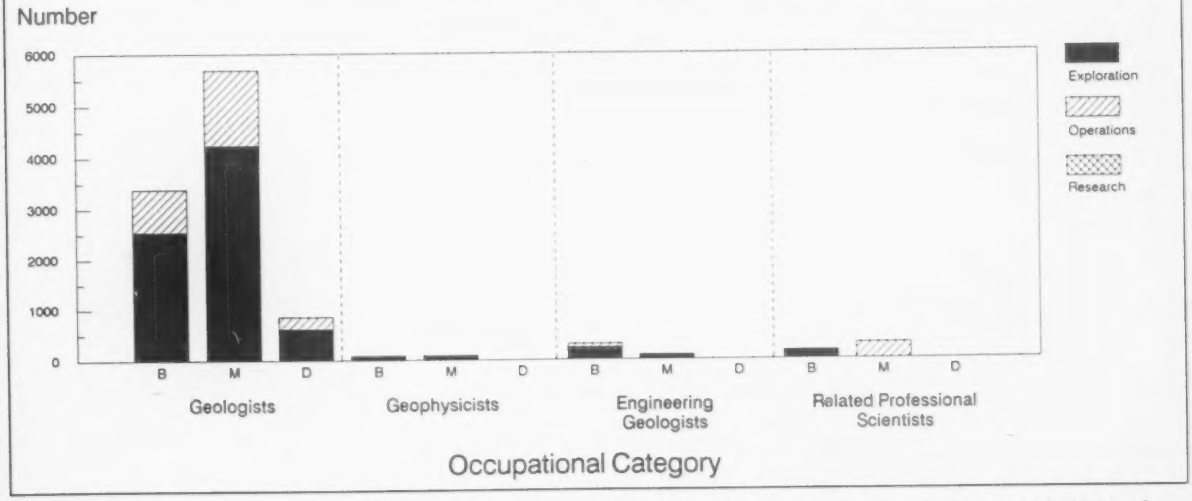
Table 25 and Figure O show the projected current employment levels (as of 12/31/88) by occupational objective and occupational category[1], by degree level:

TABLE 25

Current Employment Levels
by Occupational Objective, Occupational Category, and Degree Level
Domestic Mining and Minerals Industry

	Occupational Category																
	Geologists			Geophysicists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Exploration	2,539	4,231	615	77	77	0	231	77	0	154	0	0	3,001	4,385	615	8,001	73.2
Operations	846	1,461	231	0	0	0	77	0	0	0	308	0	923	1,769	231	2,923	26.8
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**3,385**	**5,692**	**846**	**77**	**77**	**0**	**308**	**77**	**0**	**154**	**308**	**0**	**3,924**	**6,154**	**846**	**10,924**	**100.0**
			9,923			154			385			462					

Figure O
Current Employment Levels
by Occupational Objective, Occupational Category, and Degree Level
Domestic Mining and Minerals Industry



1 Although "Geochemists" was one of the occupational categories listed on the survey there were no data provided. Therefore, that category has been omitted in the tabulations.

2. Number Hired in 1988

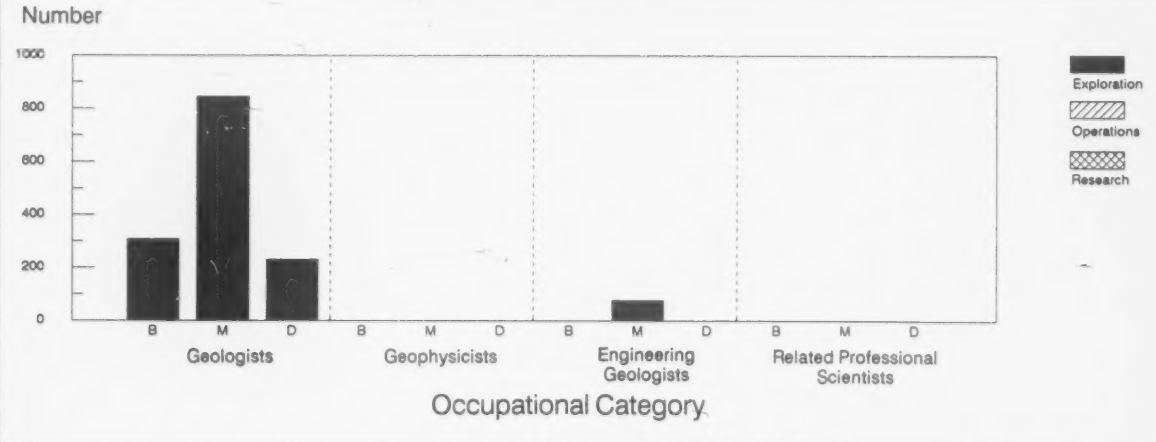
Employers provided the number of geoscientists actually hired in 1988, as shown in Table 26 and Figure P:

TABLE 26

Number of Geoscientists Actually Hired in 1988
By Occupational Objective, Occupational Category, and Degree Level
Domestic Mining and Minerals Industry

	Occupational Category																
	Geologists			Geophysicists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Exploration	308	846	231	0	0	0	0	77	0	0	0	0	308	923	231	1,462	100.0
Operations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	308	846	231	0	0	0	0	77	0	0	0	0	308	923	231	1,462	100.0
			1,385			0			77			0					

Figure P
Number of Geoscientists Actually Hired in 1988
by Occupational Objective, Occupational Category, and Degree Level
Domestic Mining and Minerals Industry



3. Projected Hiring for 1989

Employers provided the number of expected hires for 1989. Those estimates project the number of new hires (i.e., those to be hired directly from colleges/universities) and experienced hires. Table 27 shows projections for new hires, by occupational objective, occupational category, and degree level:

TABLE 27

Projected New (Inexperienced) Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Domestic Mining and Minerals Industry

	Geologists			Geophysicists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Exploration	77	231	0	0	0	0	0	0	0	0	0	0	77	231	0	308	57.1
Operations	77	154	0	0	0	0	0	0	0	0	0	0	77	154	0	231	42.9
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**154**	**385**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**154**	**385**	**0**	**539**	**100.0**
			539			**0**			**0**			**0**					

Table 28 shows projected 1989 hiring for experienced geoscientists:

TABLE 28

Projected Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Domestic Mining and Minerals Industry

Occupational Category

	Geologists			Geophysicists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Exploration	77	308	0	0	0	0	0	0	0	0	0	0	77	308	0	385	83.3
Operations	0	77	0	0	0	0	0	0	0	0	0	0	0	77	0	77	16.7
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**77**	**385**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**77**	**385**	**0**	**462**	**100.0**
			462			**0**			**0**			**0**					

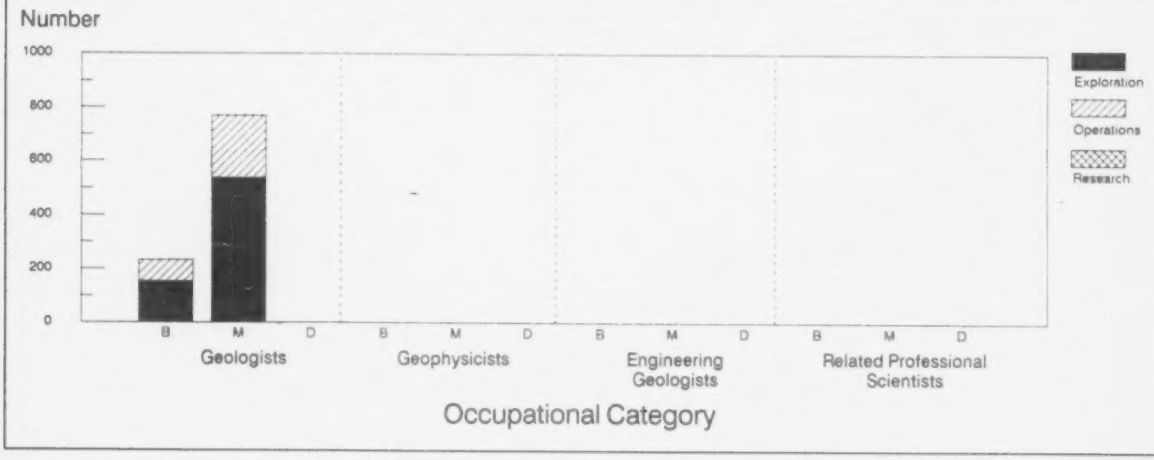
Table 29 and Figure Q present the total projected hiring (inexperienced and experienced) for 1989 for the domestic mining and minerals industry:

TABLE 29

Projected New (Inexperienced) and Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Domestic Mining and Minerals Industry

	Occupational Category																
	Geologists			Geophysicists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Exploration	154	539	0	0	0	0	0	0	0	0	0	0	154	539	0	693	69.2
Operations	77	231	0	0	0	0	0	0	0	0	0	0	77	231	0	308	30.8
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**231**	**770**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**231**	**770**	**0**	**1,001**	**100.0**
			1,001			**0**			**0**			**0**					

Figure Q
Projected Total Hires for 1989
by Occupational Objective, Occupational Category, and Degree Level
Domestic Mining and Minerals Industry



4. Projected Losses for 1989

Table 30 presents the number expected to be lost in 1989, due to resignations, retirements, and terminations:

TABLE 30

Projected Losses for 1989
By Occupational Category and Degree Level
Domestic Mining and Minerals Industry

	Occupational Category																
	Geologists			Geophysicists			Engineering Geologists			Related Professional Scientists			TOTALS				
Reason for Loss	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Resignations	77	231	0	0	0	0	0	0	0	0	0	0	77	231	0	308	66.7
Retirements	0	0	154	0	0	0	0	0	0	0	0	0	0	0	154	154	33.3
Terminations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**77**	**231**	**154**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**77**	**231**	**154**	**462**	**100.0**
			462			**0**			**0**			**0**					

5. Net Gain/Loss in Employment

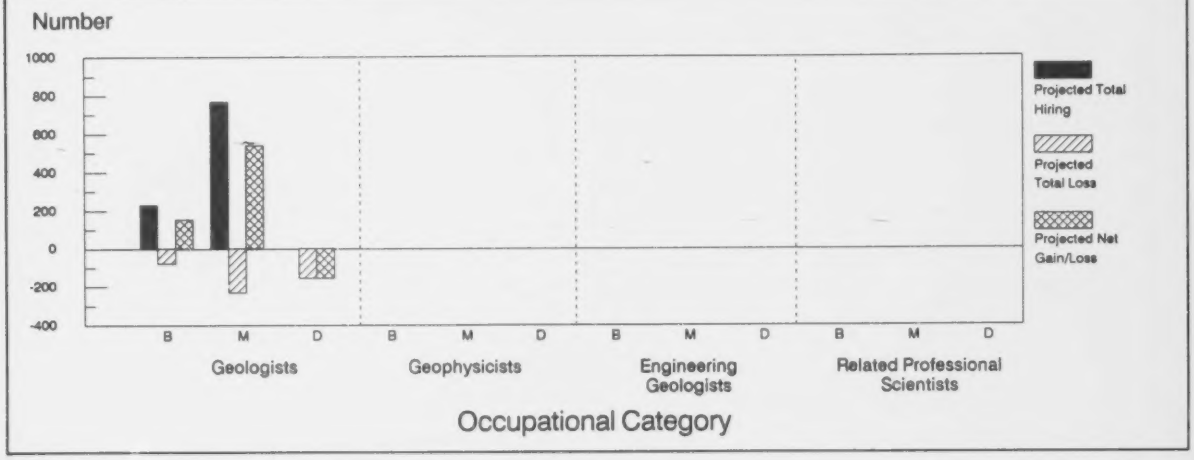
The difference between the projected total hiring and the projected total employment loss provides the net gain. Table 31 and Figure R present the net gain/loss for the domestic mining and minerals industry:

TABLE 31

Projected Net Gain/Loss in Employment
Domestic Mining and Minerals Industry

	Occupational Category															
	Geologists			Geophysicists			Engineering Geologists			Related Professional Scientists			TOTALS			
	B	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**
Projected Total Hiring	231	770	0	0	0	0	0	0	0	0	0	0	231	770	0	1,001
Projected Total Loss	77	231	154	0	0	0	0	0	0	0	0	0	77	231	154	462
Projected Net Gain/Loss	**154**	**539**	**-154**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**154**	**539**	**-154**	**539**

Figure R
Projected Net Gain/Loss in Employment
by Occupational Category and Degree Level
Domestic Mining and Minerals Industry



6. Approximate Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires by degree level are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$ 27,500
MA/MS	$ 28,334
PhD	$ 33,750

C. Federal and State Government Agencies - Federal

Appendix, Tables III.A-F

1. Current Employment Levels

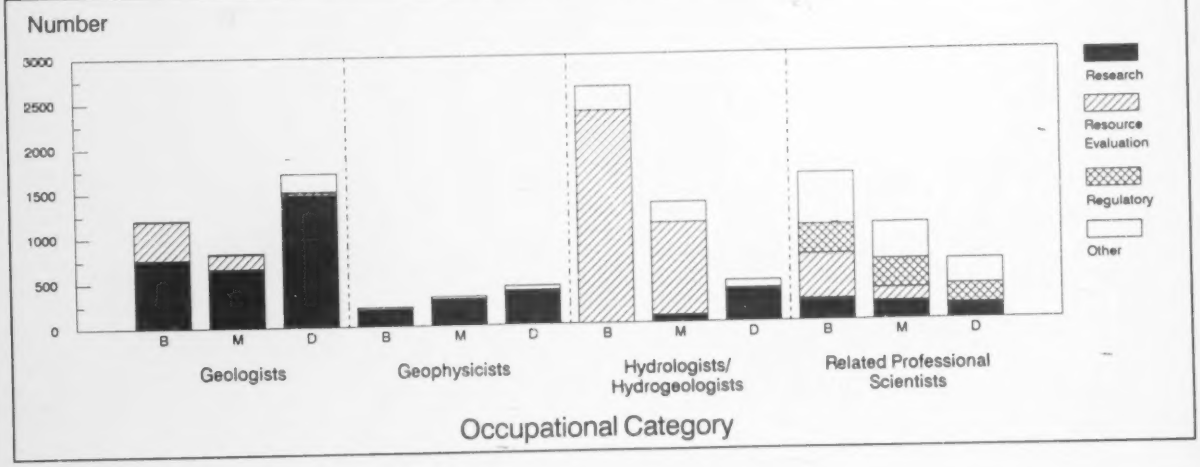
Seven federal government agencies responded to the survey. Table 32 and Figure S show projected current employment levels (as of 12/31/88) according to occupational objective and occupational category, by degree level:

TABLE 32

Current Employment Level
by Occupational Objective, Occupational Category, and Degree Level
Federal Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	763	662	1,479	192	295	372	2	82	372	235	203	160	1,192	1,242	2,383	4,817	38.5
Resource Evaluation	427	155	16	0	0	0	2,370	1,027	0	495	144	7	3,292	1,326	23	4,641	37.1
Regulatory	7	7	16	2	2	7	0	0	0	329	317	215	338	326	238	902	7.2
Other	7	2	199	21	14	53	272	228	85	578	409	279	87	8653	616	2,147	17.2
Total	1,204	826	1,710	215	311	432	2,644	1,337	457	1,637	1,073	661	5,700	3,547	3,260	12,507	100.0
			3,740			958			4,438			3,371					

Figure S
Current Employment Levels
by Occupational Objective, Occupational Category, and Degree Level
Federal Government Agencies



2. Number Hired in 1988

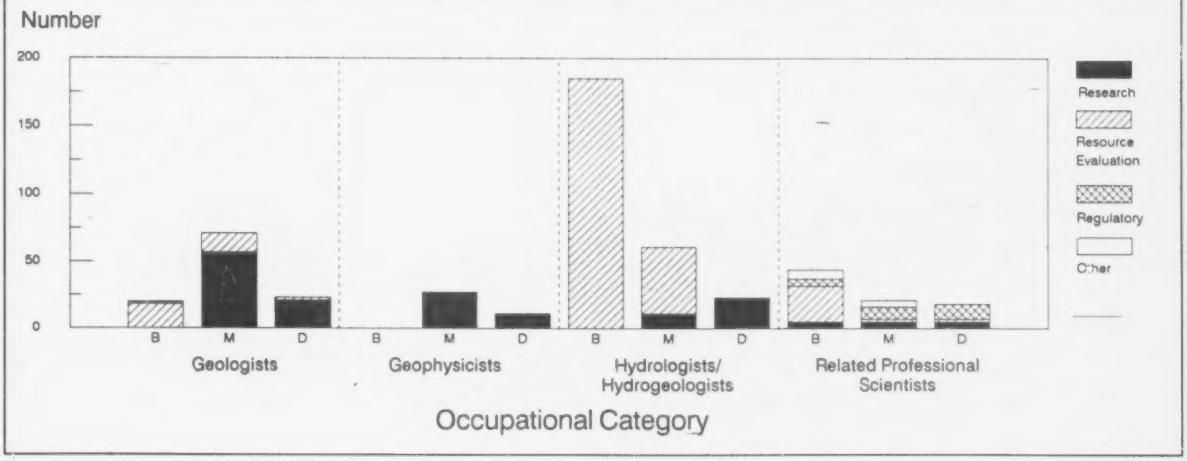
Federal agencies provided the number of geoscientists actually hired in 1988, as shown in Table 33 and Figure T:

TABLE 33

**Number of Geoscientists Actually Hired in 1988
by Occupational Objective, Occupational Category, and Degree Level
Federal Government Agencies**

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	0	57	21	0	27	11	0	11	23	5	5	5	5	100	60	165	32.7
Resource Evaluation	18	14	2	0	0	0	185	50	0	27	2	2	230	66	4	300	59.5
Regulatory	2	0	0	0	0	0	0	0	0	5	9	11	7	9	11	27	5.4
Other	0	0	0	0	0	0	0	0	0	7	5	0	7	5	0	12	2.4
Total	**20**	**71**	**23**	**0**	**27**	**11**	**185**	**61**	**23**	**44**	**21**	**18**	**249**	**180**	**75**	**504**	**100.0**
			114			**38**			**269**			**83**					

Figure T
**Number of Geoscientists Actually Hired in 1988
by Occupational Objective, Occupational Category, and Degree Level
Federal Government Agencies**



3. Projected Hiring for 1989

Employers provided the number of expected hires for 1989. Those estimates project the number of new hires (i.e., those to be hired directly from colleges/universities) and experienced hires. Table 34 shows projections for new hires, by occupational objective, occupational category, and degree level:

TABLE 34

Projected New (Inexperienced) Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Federal Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	41	18	0	14	14	0	0	5	0	2	2	0	57	39	0	96	57.5
Resource Evaluation	7	14	2	0	0	0	11	14	0	9	2	0	27	30	2	59	35.3
Regulatory	0	0	0	0	0	0	0	5	0	0	5	0	0	10	0	10	6.0
Other	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	2	1.2
Total	**48**	**32**	**2**	**14**	**14**	**0**	**11**	**24**	**0**	**13**	**9**	**0**	**86**	**79**	**2**	**167**	**100.0**
			82			**28**			**35**			**22**					

Table 35 shows projected 1989 hiring for experienced geoscientists:

TABLE 35

Projected Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Federal Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	0	0	18	0	14	9	0	2	7	5	5	5	5	21	39	65	21.2
Resource Evaluation	9	9	2	0	0	0	114	73	0	5	2	2	128	84	4	216	70.6
Regulatory	0	0	0	0	0	0	2	2	0	5	5	0	7	7	0	14	4.6
Other	0	2	0	0	0	0	0	0	0	5	2	2	5	4	2	11	3.6
Total	**9**	**11**	**20**	**0**	**14**	**9**	**116**	**77**	**7**	**20**	**14**	**9**	**145**	**116**	**45**	**306**	**100.0**
			40			**23**			**200**			**43**					

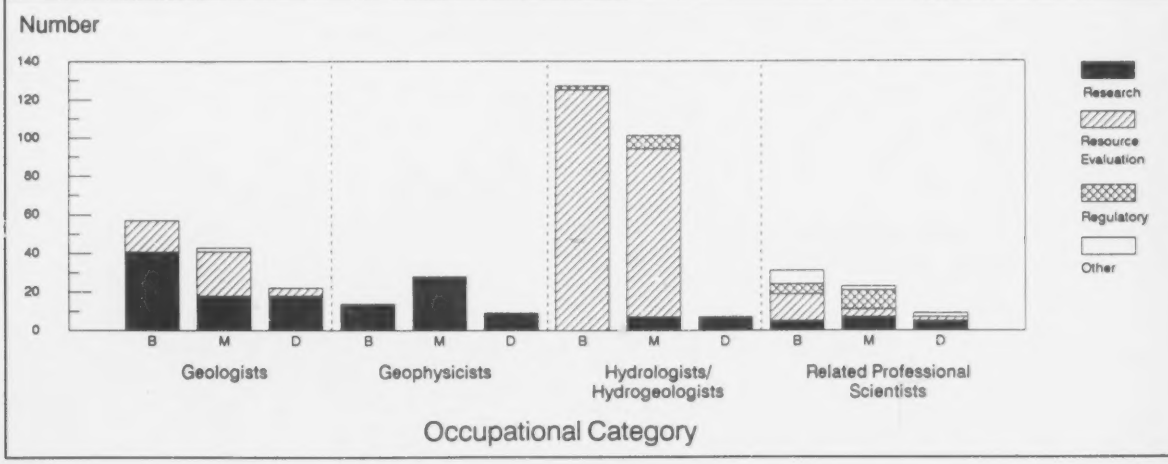
Table 36 and Figure U present the total projected hiring (inexperienced and experienced) for 1989 for federal government agencies:

TABLE 36

Projected New (Inexperienced) and Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Federal Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	41	18	18	14	28	9	0	7	7	5	7	5	62	60	39	161	34.0
Resource Evaluation	16	23	4	0	0	0	125	87	0	14	4	2	155	114	6	275	58.1
Regulatory	0	0	0	0	0	0	2	7	0	5	10	0	7	17	0	24	5.1
Other	0	2	0	0	0	0	0	0	0	7	2	2	7	4	2	13	2.8
Total	57	43	22	14	28	9	127	101	7	33	23	9	231	195	47	473	100.0
			122			51			235			65					

Figure U
Projected Total Hires for 1989
by Occupational Objective, Occupational Category, and Degree Level
Federal Government Agencies



4. Projected Losses for 1989

Table 37 presents the number expected to be lost in 1989, due to resignations, retirements, and terminations:

TABLE 37

Projected Losses for 1989
By Occupational Category and Degree Level
Federal Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Reason for Loss	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Resignations	14	9	2	5	2	7	91	32	0	18	14	5	128	57	14	199	48.8
Retirements	7	37	48	0	7	11	27	18	0	32	11	11	66	73	70	209	51.2
Terminations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**21**	**46**	**50**	**5**	**9**	**18**	**118**	**50**	**0**	**50**	**25**	**16**	**194**	**130**	**84**	**408**	**100.0**
			117			**32**			**168**			**91**					

5. Net Gain/Loss in Employment

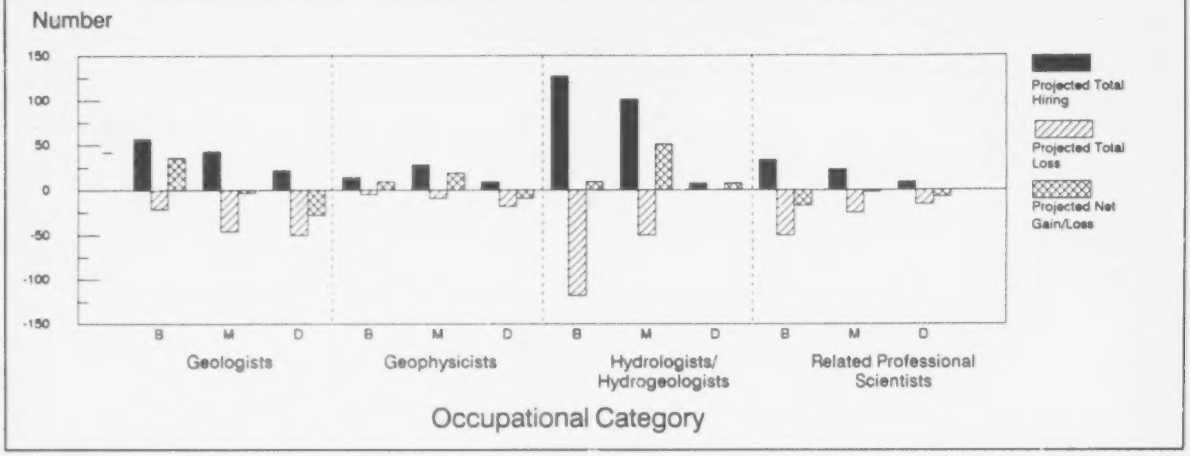
The difference between the projected total hiring and the projected total employment loss provides the net gain. Table 38 and Figure V present the net gain/loss for federal government agencies:

TABLE 38

Projected Net Gain/Loss in Employment
Federal Government Agencies

	Occupational Category															
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS			
	B	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**
Projected Total Hiring	57	43	22	14	28	9	127	101	7	33	23	9	231	195	47	473
Projected Total Loss	21	46	50	5	9	18	118	50	0	50	25	16	194	130	84	408
Projected Net Gain/Loss	**36**	**-3**	**-28**	**9**	**19**	**-9**	**9**	**51**	**7**	**-17**	**-2**	**-7**	**37**	**65**	**-37**	**65**

Figure V
Projected Net Gain/Loss in Employment
by Occupational Category and Degree Level
Federal Government Agencies



6. Approximate Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires by degree level are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$ 19,167
MA/MS	$ 24,643
PhD	$ 29,400

C. Federal and State Government Agencies - State

Appendix, Tables III.G-L

1. Current Employment Levels

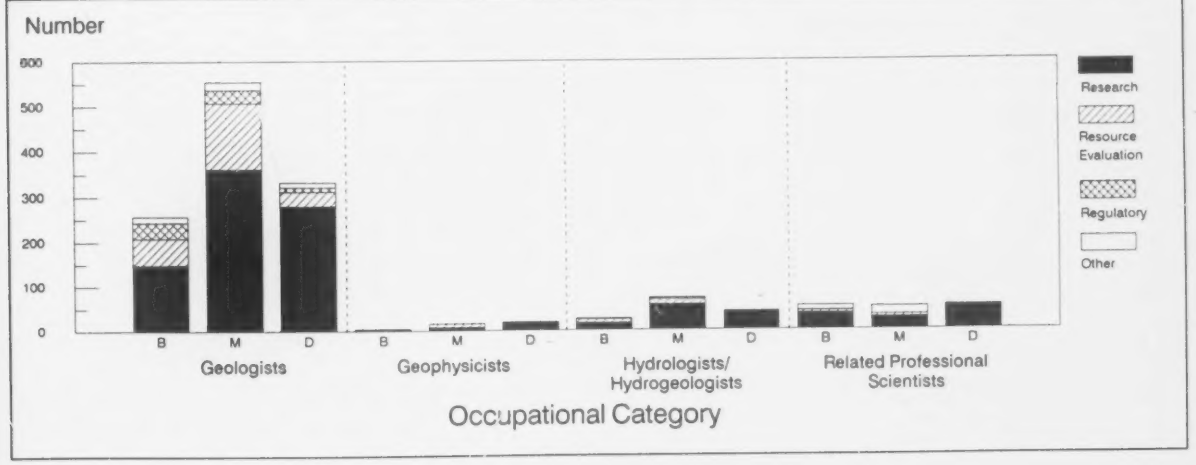
Thirty-one state government agencies responded to the survey. Table 39 and Figure W show projected current employment levels (as of 12/31/88) according to occupational objective and occupational category, by degree level:

TABLE 39

Current Employment Level
by Occupational Objective, Occupational Category, and Degree Level
State Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	149	360	280	0	8	16	16	57	39	37	27	49	202	452	384	1,038	70.4
Resource Evaluation	59	147	31	4	8	0	8	12	2	4	6	2	75	173	35	283	19.2
Regulatory	35	29	10	0	0	0	0	2	0	2	0	0	37	31	10	78	5.3
Other	14	18	10	0	0	2	2	0	0	10	18	2	26	36	14	76	5.2
Total	**257**	**554**	**331**	**4**	**16**	**18**	**26**	**71**	**41**	**53**	**51**	**53**	**340**	**692**	**443**	**1,475**	**100.1**
			1,142			**38**			**138**			**157**					

Figure W
Current Employment Levels
by Occupational Objective, Occupational Category, and Degree Level
State Government Agencies



2. Number Hired in 1988

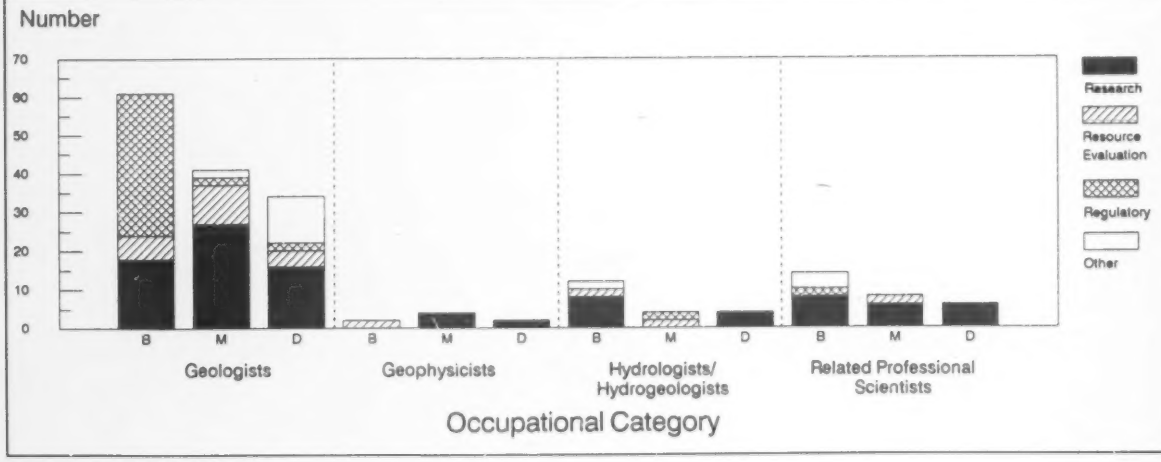
State agencies provided the number of geoscientists actually hired in 1988, as shown in Table 40 and Figure X:

TABLE 40

**Number of Geoscientists Actually Hired in 1988
by Occupational Objective, Occupational Category, and Degree Level
State Government Agencies**

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Research	18	27	16	0	4	2	8	0	4	8	6	6	34	37	28	99	51.6
Resource Evaluation	6	10	4	2	0	0	2	2	0	0	2	0	10	14	4	28	14.6
Regulatory	37	2	2	0	0	0	0	2	0	2	0	0	39	4	2	45	23.4
Other	0	2	12	0	0	0	2	0	0	4	0	0	6	2	12	20	10.4
Total	**61**	**41**	**34**	**2**	**4**	**2**	**12**	**4**	**4**	**14**	**8**	**6**	**89**	**57**	**46**	**192**	**100.0**
			136			**8**			**20**			**28**					

Figure X
**Number of Geoscientists Actually Hired in 1988
by Occupational Objective, Occupational Category, and Degree Level
State Government Agencies**



3. Projected Hiring for 1989

Employers provided the number of expected hires for 1989. Those estimates project the number of new hires (i.e., those to be hired directly from colleges/universities) and experienced hires. Table 41 shows projections for new hires, by occupational objective, occupational category, and degree level:

TABLE 41

Projected New (Inexperienced) Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
State Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	8	12	8	0	0	0	0	2	2	2	2	2	10	16	12	38	86.4
Resource Evaluation	0	4	0	0	0	0	0	0	0	0	0	0	0	4	0	4	9.1
Regulatory	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	4.5
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**10**	**16**	**8**	**0**	**0**	**0**	**0**	**2**	**2**	**2**	**2**	**2**	**12**	**20**	**12**	**44**	**100.0**
			34			0			4			6					

Table 42 shows projected 1989 hiring for experienced geoscientists:

TABLE 42

Projected Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
State Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	4	14	4	0	0	2	8	4	12	2	2	0	14	20	18	52	53.1
Resource Evaluation	4	8	2	0	0	0	0	2	0	0	2	0	4	12	2	18	18.4
Regulatory	6	0	2	0	0	0	0	0	0	2	0	0	8	0	2	10	10.2
Other	0	4	12	0	0	0	0	0	0	0	0	2	0	4	14	18	18.4
Total	**14**	**26**	**20**	**0**	**0**	**2**	**8**	**6**	**12**	**4**	**4**	**2**	**26**	**36**	**36**	**98**	**100.0**
			60			2			26			10					

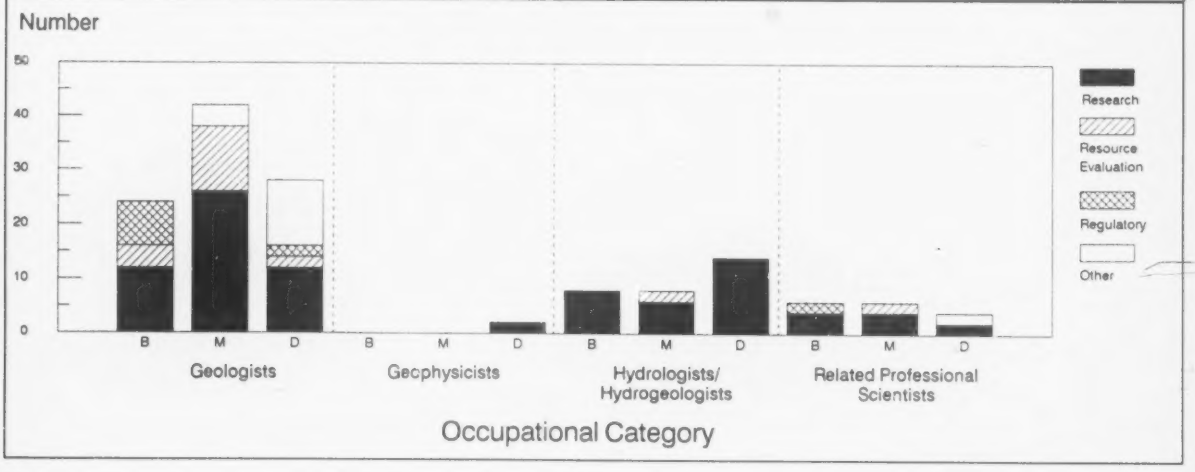
Table 43 and Figure Y present the total projected hiring (inexperienced and experienced) for 1989 for state government agencies:

TABLE 43

Projected New (Inexperienced) and Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
State Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Occupational Objective	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Research	12	26	12	0	0	2	8	6	14	4	4	2	24	36	30	90	63.4
Resource Evaluation	4	12	2	0	0	0	0	2	0	0	2	0	4	16	2	22	15.5
Regulatory	8	0	2	0	0	0	0	0	0	2	0	0	10	0	2	12	8.5
Other	0	4	12	0	0	0	0	0	0	0	0	2	0	4	14	18	12.7
Total	**24**	**42**	**28**	**0**	**0**	**2**	**8**	**8**	**14**	**6**	**6**	**4**	**38**	**56**	**48**	**142**	**100.0**
			94			2			30			16					

Figure Y
Projected Total Hires for 1989
by Occupational Objective, Occupational Category, and Degree Level
State Government Agencies



4. Projected Losses for 1989

Table 44 presents the number expected to be lost in 1989, due to resignations, retirements, and terminations:

TABLE 44

Projected Losses for 1989
By Occupational Category and Degree Level
State Government Agencies

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS				
Reason for Loss	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Resignations	4	18	6	0	0	0	4	4	0	0	2	2	8	24	8	40	64.5
Retirements	2	12	0	0	0	0	0	2	0	0	0	0	2	14	0	16	25.8
Terminations	2	4	0	0	0	0	0	0	0	0	0	0	2	4	0	6	9.7
Total	**8**	**34**	**6**	**0**	**0**	**0**	**4**	**6**	**0**	**0**	**2**	**2**	**12**	**42**	**8**	**62**	**100.0**
			48			**0**			**10**			**4**					

5. Net Gain/Loss in Employment

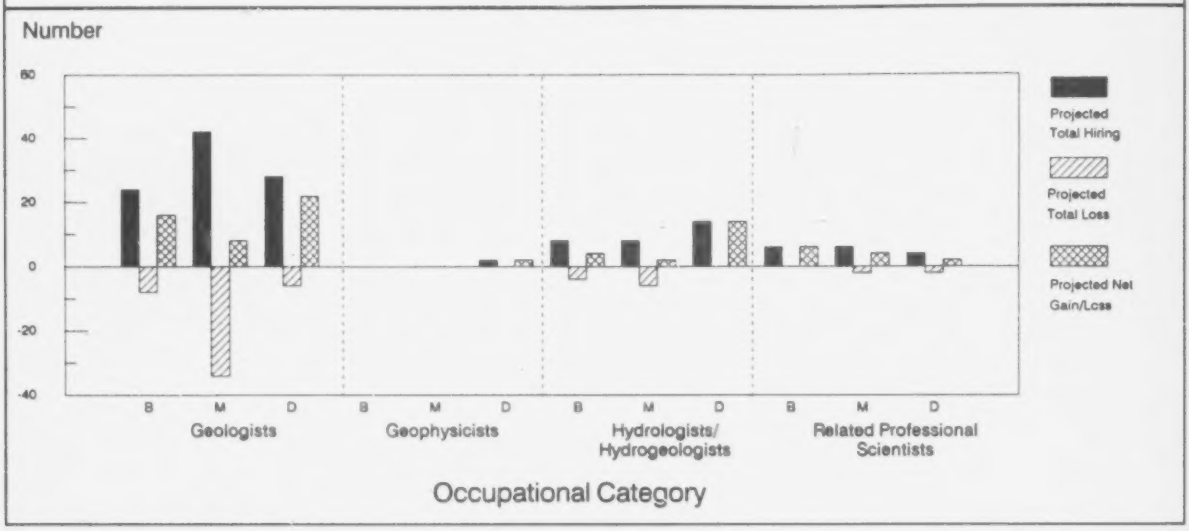
The difference between the projected total hiring and the projected total employment loss provides the net gain. Table 45 and Figure Z present the net gain/loss for state government agencies:

TABLE 45

Projected Net Gain/Loss in Employment
State Government Agencies

	Occupational Category															
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			TOTALS			
	B	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**
Projected Total Hiring	24	42	28	0	0	2	8	8	14	6	6	4	38	56	48	142
Projected Total Loss	8	34	6	0	0	0	4	6	0	0	2	2	12	42	8	62
Projected Net Gain/Loss	**16**	**8**	**22**	**0**	**0**	**2**	**4**	**2**	**14**	**6**	**4**	**2**	**26**	**14**	**40**	**80**

Figure Z
Projected Net Gain/Loss in Employment
by Occupational Category and Degree Level
State Government Agencies



6. Approximate Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires by degree level are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$ 20,648
MA/MS	$ 25,000
PhD	$ 30,208

D. Research Institutions and DOE-funded National Laboratories - Research Institutions

Appendix, Tables IV.A-D

1. Current Employment Levels

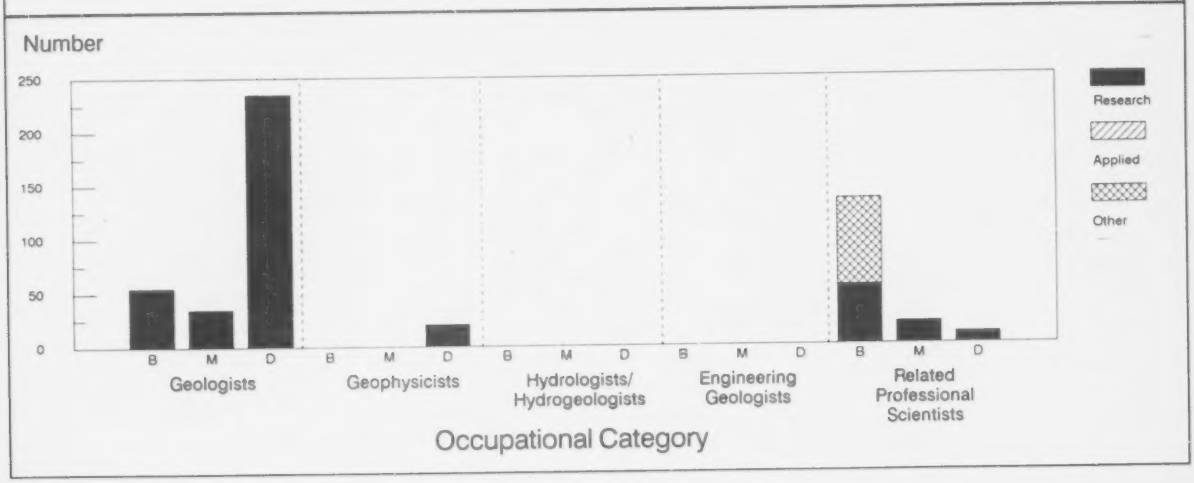
For this edition of the survey, this category was expanded to include research institutions as well as DOE-funded national laboratories. Five such research institutions returned employment and hiring information. Table 46 and Figure a present current employment levels (as of 12/31/88) according to occupational objective and occupational category, by degree level:

TABLE 46

Current Employment Level
by Occupational Objective, Occupational Category, and Degree Level
Research Institutions

	Occupational Category																			
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	55	35	235	0	0	20	0	0	0	0	0	0	55	20	10	110	55	265	430	84.3
Applied	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	80	0	0	80	15.7
Total	**55**	**35**	**235**	**0**	**0**	**20**	**0**	**0**	**0**	**0**	**0**	**0**	**135**	**20**	**10**	**190**	**55**	**265**	**510**	**100.0**
			325			**20**			**0**			**0**			**165**					

Figure a
Current Employment Levels
by Occupational Objective, Occupational Category, and Degree Level
Research Institutions



2. Number Hired in 1988

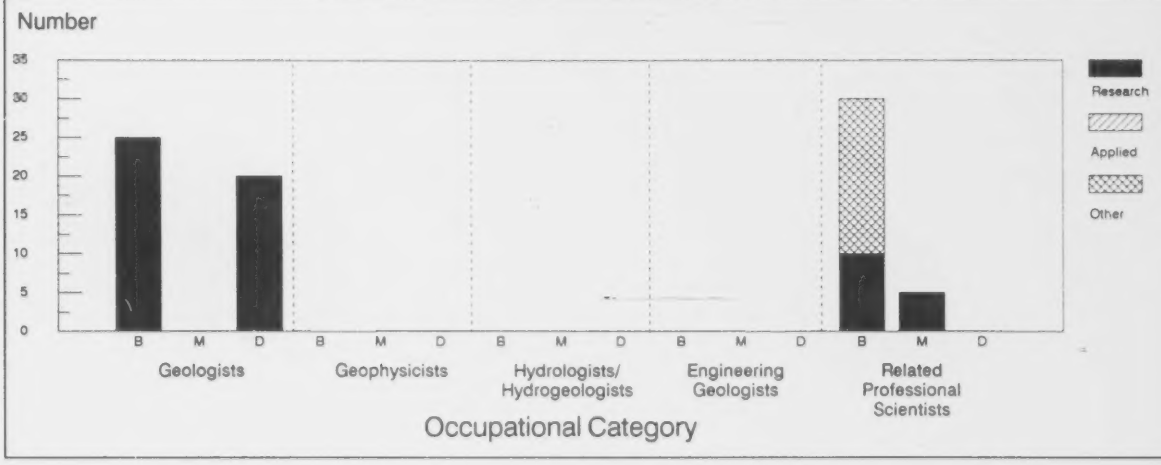
Research institutions provided the number of geoscientists actually hired in 1988, as shown in Table 47 and Figure b:

TABLE 47

Number of Geoscientists Actually Hired in 1988 by Occupational Objective, Occupational Category, and Degree Level Research Institutions

	Occupational Category																		
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	25	0	20	0	0	0	0	0	0	0	0	0	10	5	0	35	5	20	60	75.0
Applied	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	20	0	0	20	25.0
Total	25	0	20	0	0	0	0	0	0	0	0	0	30	5	0	55	5	20	80	100.0
			45			0			0			0			35					

Figure b
Number of Geoscientists Actually Hired in 1988 by Occupational Objective, Occupational Category, and Degree Level Research Institutions



3. Projected Hiring for 1989

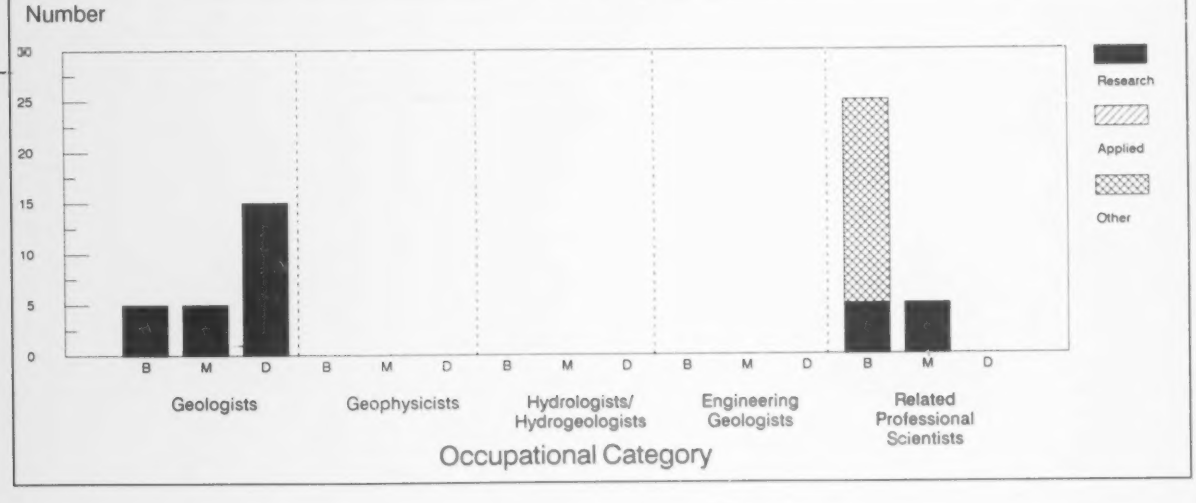
Employers provided the number of expected hires for 1989. Those estimates project the number of new hires (i.e., those to be hired directly from colleges/universities) and experienced hires. The responding research institutions indicated that there would be no hiring in 1989 of experienced geoscientists. Table 48 and Figure c, therefore, show the total to be hired in 1989, according to occupational objective, occupational category, and degree level:

TABLE 48

Projected New (Inexperienced) and Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Research Institutions

	Occupational Category																		
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	5	5	15	0	0	0	0	0	0	0	0	0	5	5	0	10	10	15	35	63.6
Applied	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	20	0	0	20	36.4
Total	5	5	15	0	0	0	0	0	0	0	0	0	25	5	0	30	10	15	55	100.0
			25			0			0			0			30					

Figure c
Projected Total Hires for 1989
by Occupational Objective, Occupational Category, and Degree Level
Research Institutions



4. Projected Losses for 1989

Table 49 presents the number expected to be lost in 1989, due to resignations, retirements, and terminations:

TABLE 49

Projected Losses for 1989
By Occupational Category and Degree Level
Research Institutions

Occupational Category

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS				
Reason for Loss	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Resignations	10	0	5	0	0	0	0	0	0	0	0	0	0	10	0	10	10	5	25	55.6
Retirements	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Terminations	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	20	0	0	20	44.4
Total	**10**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**10**	**0**	**30**	**10**	**5**	**45**	**100.0**
			15			**0**			**0**			**0**			**30**					

5. Net Gain/Loss in Employment

The difference between the projected total hiring and the projected total employment loss provides the net gain. Table 50 and Figure d present the net gain/loss for research institutions:

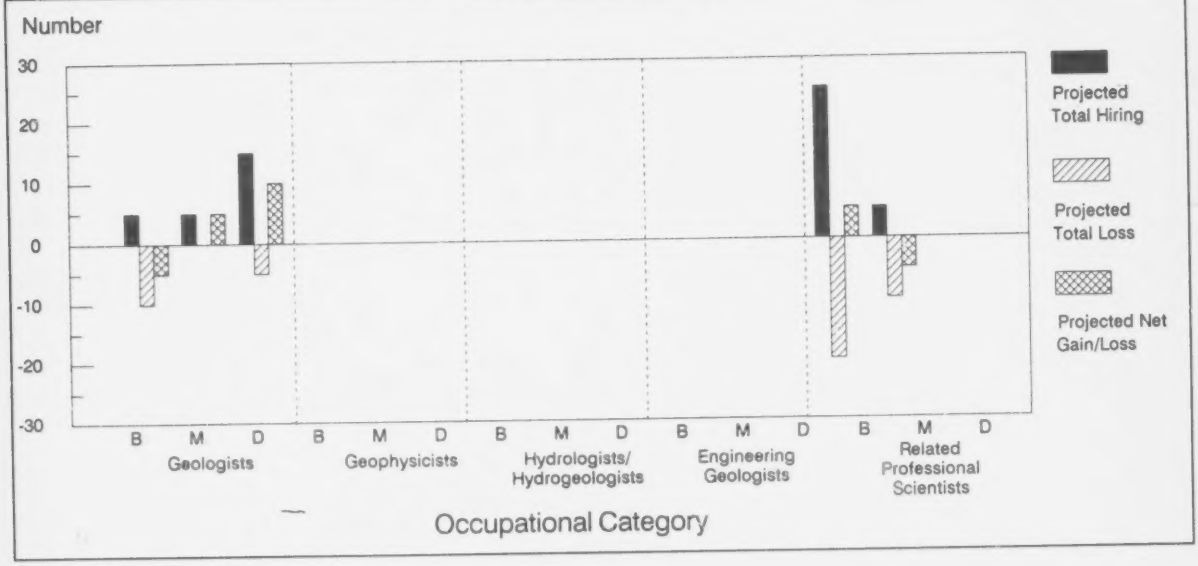
TABLE 50

Projected Net Gain/Loss in Employment
Research Institutions

Occupational Category

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
	B	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**
Projected Total Hiring	5	5	15	0	0	0	0	0	0	0	0	0	25	5	0	30	10	15	55
Projected Total Loss	10	0	5	0	0	0	0	0	0	0	0	0	20	10	0	30	10	5	45
Projected Net Gain/Loss	**-5**	**5**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**-5**	**0**	**0**	**0**	**10**	**10**

Figure d
Projected Net Gain/Loss in Employment
by Occupational Category and Degree Level
Research Institutions



6. Approximate Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires by degree level are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$ 19,000
MA/MS	$ 19,833
PhD	$ 32,500

D. Research Institutions and DOE-funded National Laboratories - DOE-funded National Laboratories

Appendix, Tables IV. E-J

1. Current Employment Levels

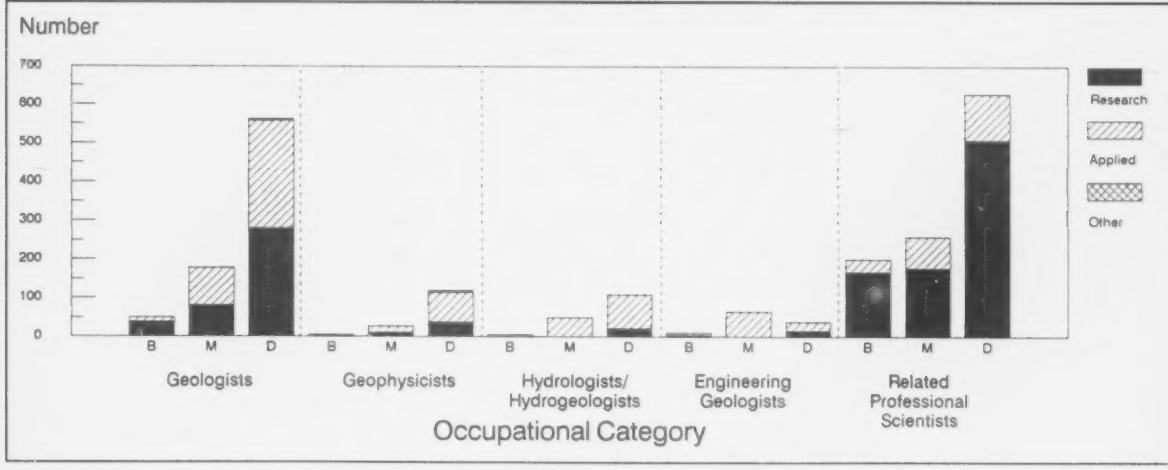
Four DOE-funded national laboratories returned employment and hiring information. Table 51 and Figure e present current employment levels (as of 12/31/88) according to occupational objective and occupational category, by degree level:

TABLE 51

Current Employment Level
by Occupational Objective, Occupational Category, and Degree Level
DOE-funded National Laboratories

	Occupational Category																			
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	38	81	281	5	11	38	0	0	22	5	0	16	168	178	508	216	270	865	1,351	58.7
Applied	11	97	276	0	16	76	5	49	87	5	65	22	32	81	119	53	308	580	941	40.9
Other	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	10	10	0.4
Total	**49**	**178**	**568**	**5**	**27**	**119**	**5**	**49**	**109**	**10**	**65**	**38**	**200**	**259**	**627**	**269**	**578**	**1,455**	**2,302**	**100.0**
			789			**151**			**163**			**113**			**1,086**					

Figure e
Current Employment Levels
by Occupational Objective, Occupational Category, and Degree Level
DOE-funded National Laboratories



2. Number Hired in 1988

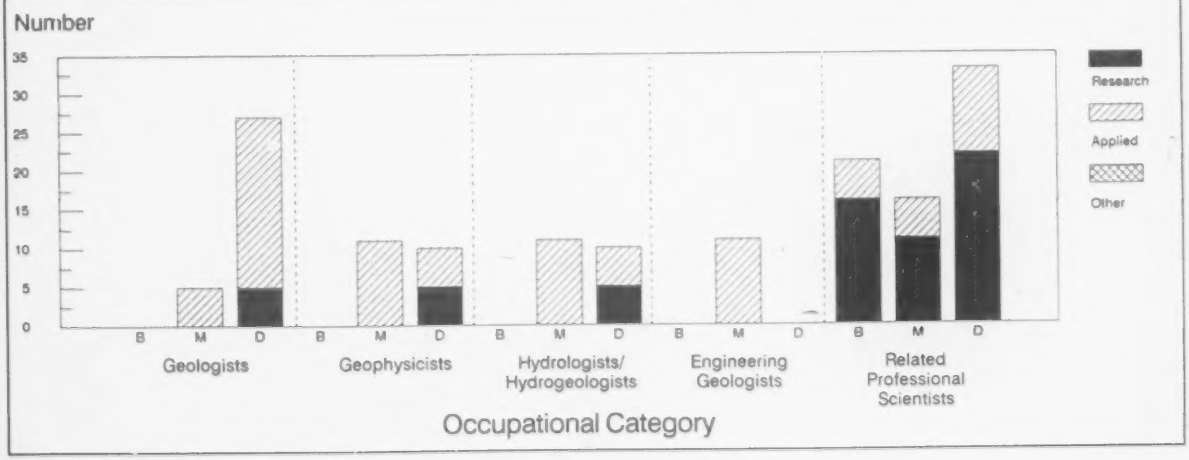
DOE-funded national laboratories provided the number of geoscientists actually hired in 1988, as shown in Table 52 and Figure f:

TABLE 52

Number of Geoscientists Actually Hired in 1988 by Occupational Objective, Occupational Category, and Degree Level DOE-funded National Laboratories

	Occupational Category																			
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	0	0	5	0	0	5	0	0	5	0	0	0	16	11	22	16	11	37	64	41.3
Applied	0	5	22	0	11	5	0	11	5	0	11	0	5	5	11	5	43	43	91	58.7
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	0	5	27	0	11	10	0	11	10	0	11	0	21	16	33	21	54	80	155	100.0
			32			21			21			11			70					

Figure f
Number of Geoscientists Actually Hired in 1988 by Occupational Objective, Occupational Category, and Degree Level DOE-funded National Laboratories



3. Projected Hiring for 1989

Employers provided the number of expected hires for 1989. Those estimates project the number of new hires (i.e., those to be hired directly from colleges/universities) and experienced hires. Table 53 shows projections for new hires, by occupational objective, occupational category, and degree level:

TABLE 53

Projected New (Inexperienced) Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
DOE-funded National Laboratories

Occupational Category

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Research	0	0	11	0	0	11	0	0	5	0	0	0	0	0	0	0	0	27	27	22.0
Applied	0	0	22	0	0	11	0	16	16	0	16	5	5	5	0	5	37	54	96	78.0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**0**	**0**	33	**0**	**0**	22	**0**	**16**	21	**0**	**16**	5	**5**	**5**	0	**5**	**37**	**81**	**123**	**100.0**
			33			22			37			21			10					

Table 54 shows projected 1989 hiring for experienced geoscientists:

TABLE 54

Projected Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
DOE-funded National Laboratories

Occupational Category

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS				
Occupational Objective	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Research	0	0	11	0	0	5	0	0	0	0	0	0	0	0	0	0	0	16	16	17.6
Applied	0	11	11	0	0	5	0	5	16	0	11	11	0	0	5	0	27	48	75	82.4
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	**0**	**11**	22	**0**	**0**	10	**0**	**5**	16	**0**	**11**	11	**0**	**0**	5	**0**	**27**	**64**	**91**	**100.0**
			33			10			21			22			5					

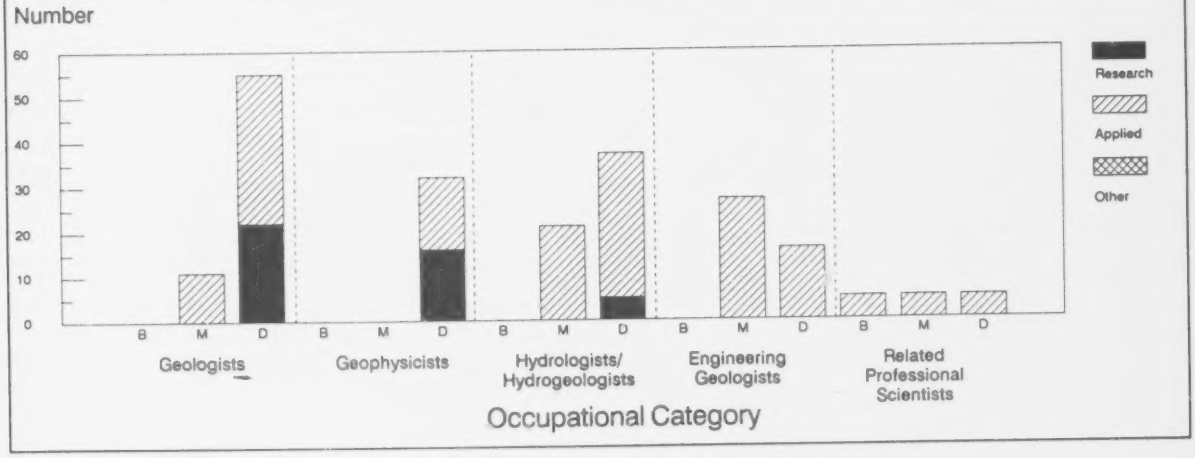
Table 55 and Figure g present the total projected hiring (inexperienced and experienced) for 1989 for DOE-funded national laboratories:

TABLE 55

Projected New (Inexperienced) and Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
DOE-funded National Laboratories

	Occupational Category																		
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Research	0	0	22	0	0	16	0	0	5	0	0	0	0	0	0	0	0	43	43	20.1
Applied	0	11	33	0	0	16	0	21	32	0	27	16	5	5	5	5	64	102	171	79.9
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	0	11	55	0	0	32	0	21	37	0	27	16	5	5	5	5	64	145	214	100.0
			66			32			58			43			15					

Figure g
Projected Total Hires for 1989
by Occupational Objective, Occupational Category, and Degree Level
DOE-funded National Laboratories



4. Projected Losses for 1989

Table 56 presents the number expected to be lost in 1989, due to resignations, retirements, and terminations:

TABLE 56

Projected Losses for 1989
By Occupational Category and Degree Level
DOE-funded National Laboratories

Occupational Category

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS				
Reason for Loss	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Resignations	0	11	11	0	0	0	0	11	5	0	11	0	0	5	5	0	38	21	59	59.6
Retirements	0	0	5	0	0	5	0	0	0	0	5	0	0	0	5	0	5	15	20	20.2
Terminations	0	0	5	0	0	5	0	0	0	0	0	0	5	5	0	5	5	10	20	20.2
Total	**0**	**11**	**21**	**0**	**0**	**10**	**0**	**11**	**5**	**0**	**16**	**0**	**5**	**10**	**10**	**5**	**48**	**46**	**99**	**100.0**
			32			**10**			**16**			**16**			**25**					

5. Net Gain/Loss in Employment

The difference between the projected total hiring and the projected total employment loss provides the net gain. Table 57 and Figure h present the net gain/loss for DOE-funded national laboratories:

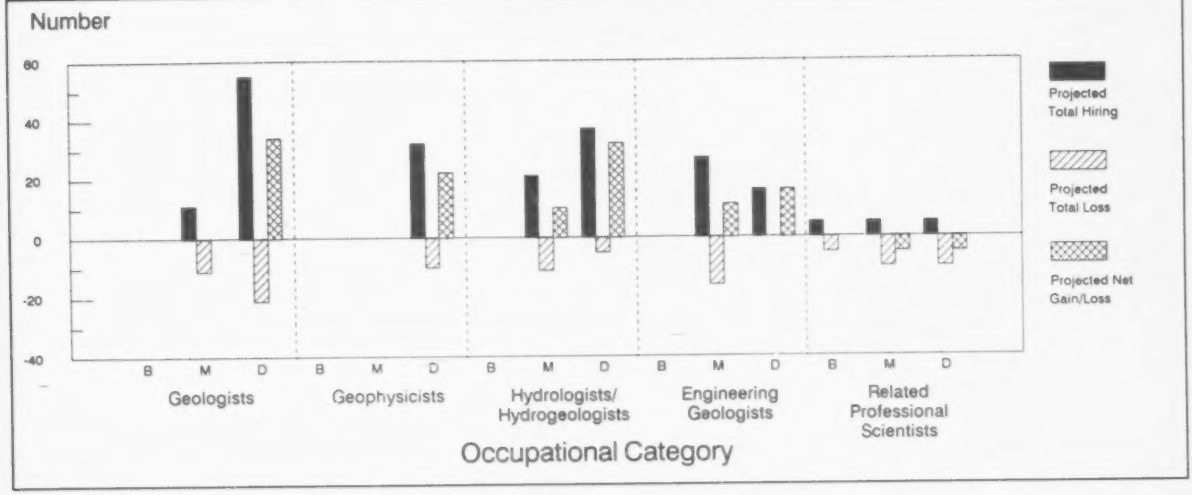
TABLE 57

Projected Net Gain/Loss in Employment
DOE-funded National Laboratories

Occupational Category

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
	B	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**
Projected Total Hiring	0	11	55	0	0	32	0	21	37	0	27	16	5	5	5	5	64	145	214
Projected Total Loss	0	11	21	0	0	10	0	11	5	0	16	0	5	10	10	5	48	46	99
Projected Net Gain/Loss	**0**	**0**	**34**	**0**	**0**	**22**	**0**	**10**	**32**	**0**	**11**	**16**	**0**	**-5**	**-5**	**0**	**16**	**99**	**115**

Figure h
Projected Net Gain/Loss in Employment
by Occupational Category and Degree Level
DOE-funded National Laboratories



6. Approximate Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires by degree level are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$ 30,000
MA/MS	$ 32,500
PhD	$ 37,500

E. Geoscientific Consulting Firms

Appendix, Tables V.A-F

1. Current Employment Levels

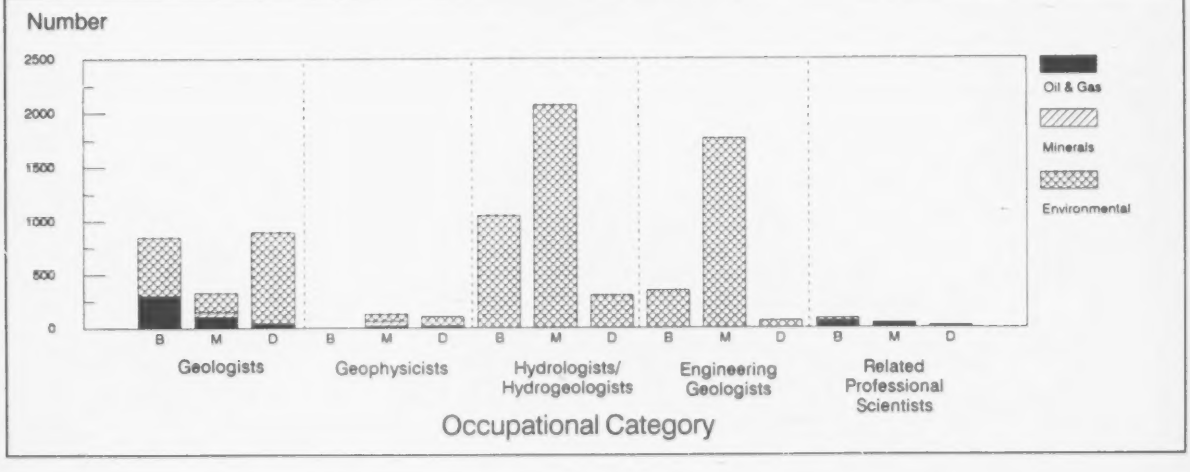
Six geoscientific consulting firms returned employment and hiring information. Table 58 and Figure j present current employment levels (as of 12/31/88) according to occupational objective and occupational category, by degree level:

TABLE 58

Current Employment Level
by Occupational Objective, Occupational Category, and Degree Level
Geoscientific Consulting Firms

	Occupational Category																		
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Oil and Gas	304	109	44	0	22	22	0	0	0	0	0	0	65	44	22	369	175	88	632	7.9
Minerals	0	44	0	0	44	0	0	0	0	0	0	0	0	0	0	0	88	0	88	1.1
Environmental	544	174	848	0	65	87	1,044	2,065	304	348	1,761	65	22	0	0	1,958	4,065	1,304	7,327	91.0
Total	**848**	**327**	**892**	**0**	**131**	**109**	**1,044**	**2,065**	**304**	**348**	**1,761**	**65**	**87**	**44**	**22**	**2,327**	**4,328**	**1,392**	**8,047**	**100.0**
			2,067			240			3,413			2,174			153					

Figure j
Current Employment Levels
by Occupational Objective, Occupational Category, and Degree Level
Geoscientific Consulting Firms



2. Number Hired in 1988

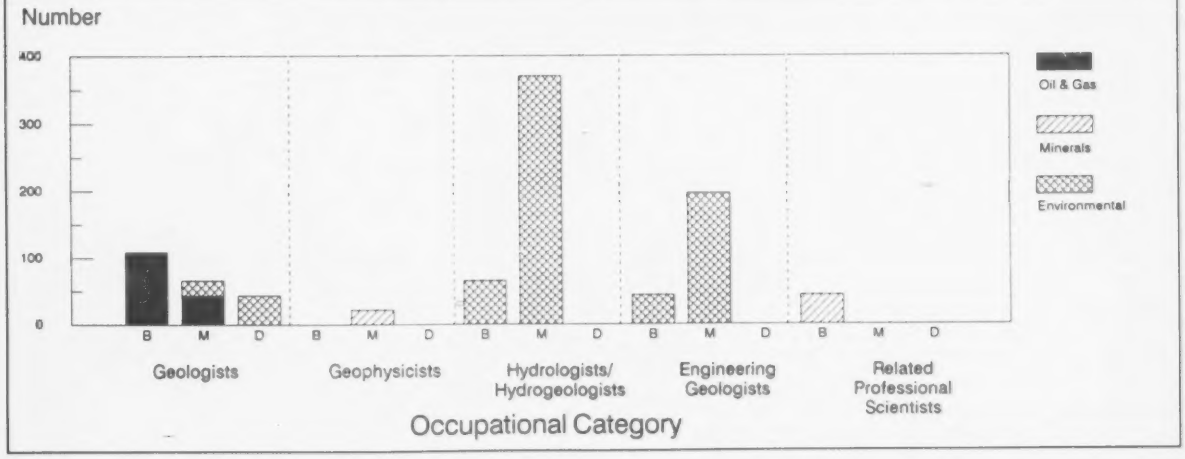
Geoscientific consulting firms provided the number of geoscientists actually hired in 1988, as shown in Table 59 and Figure k:

TABLE 59

Number of Geoscientists Actually Hired in 1988 by Occupational Objective, Occupational Category, and Degree Level Geoscientific Consulting Firms

	Occupational Category															TOTALS				
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists							
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Oil and Gas	109	44	0	0	0	0	0	0	0	0	0	0	0	0	0	109	44	0	15	315.9
Minerals	0	0	0	0	22	0	0	0	0	0	0	0	44	0	0	44	22	0	6	66.9
Environmental	0	22	44	0	0	0	65	370	0	44	196	0	0	0	0	109	588	44	741	77.2
Total	109	66	44	0	22	0	65	370	0	44	196	0	44	0	0	262	654	44	960	100.0
			219			22			435			240			44					

Figure k
Number of Geoscientists Actually Hired in 1988 by Occupational Objective, Occupational Category, and Degree Level Geoscientific Consulting Firms



3. Projected Hiring for 1989

Employers provided the number of expected hires for 1989. Those estimates project the number of new hires (i.e., those to be hired directly from colleges/universities) and experienced hires. Table 60 shows projections for new hires, by occupational objective, occupational category, and degree level:

TABLE 60

Projected New (Inexperienced) Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Geoscientific Consulting Firms

	Occupational Category																		
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Oil and Gas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Minerals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Environmental	0	0	44	0	22	22	0	457	44	0	217	0	0	0	0	0	696	110	806	100.0
Total	**0**	**0**	**44**	**0**	**22**	**22**	**0**	**457**	**44**	**0**	**217**	**0**	**0**	**0**	**0**	**0**	**696**	**110**	**806**	**100.0**
			44			**44**			**501**			**217**			**0**					

Table 61 shows projected 1989 hiring for experienced geoscientists:

TABLE 61

Projected Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Geoscientific Consulting Firms

	Occupational Category																		
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Oil and Gas	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	22	4.8
Minerals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Environmental	0	0	22	0	22	0	0	217	22	0	130	0	22	0	0	22	369	44	435	95.2
Total	**22**	**0**	**22**	**0**	**22**	**0**	**0**	**217**	**22**	**0**	**130**	**0**	**22**	**0**	**0**	**44**	**369**	**44**	**457**	**100.0**
			44			**22**			**239**			**130**			**22**					

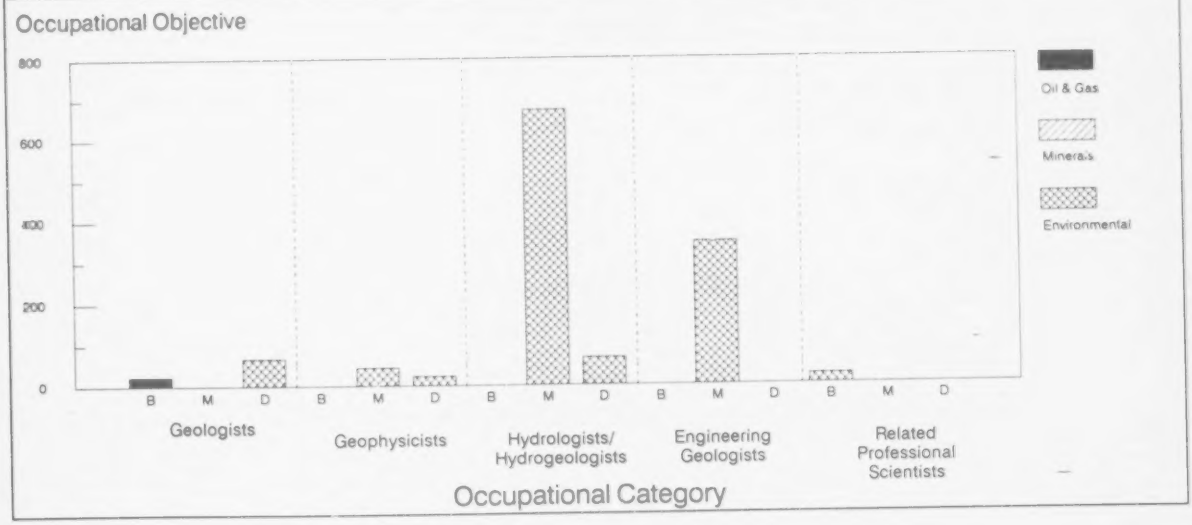
Table 62 and Figure l present the total projected hiring (inexperienced and experienced) for 1989 for geoscientific consulting firms:

TABLE 62

Projected New (Inexperienced) and Experienced Hires for 1989
By Occupational Objective, Occupational Category, and Degree Level
Geoscientific Consulting Firms

	Occupational Category																		
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
Occupational Objective	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Oil and Gas	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	22	1.7
Minerals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Environmental	0	0	66	0	44	22	0	674	66	0	347	0	22	0	0	22	1,065	154	1,241	98.3
Total	22	0	66	0	44	22	0	674	66	0	347	0	22	0	0	44	1,065	154	1,263	100.0
			88			66			740			347			22					

Figure l
Projected Total Hires for 1989
by Occupational Objective, Occupational Category, and Degree Level
Geoscientific Consulting Firms



4. Projected Losses for 1989

Table 63 presents the number expected to be lost in 1989, due to resignations, retirements, and terminations:

TABLE 63

Projected Losses for 1989
By Occupational Category and Degree Level
Geoscientific Consulting Firms

Occupational Category

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS				
Reason for Loss	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Resignations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Retirements	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Terminations	0	0	0	0	0	0	44	65	0	22	44	0	0	0	0	66	109	0	175	100.0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**44**	**65**	**0**	**22**	**44**	**0**	**0**	**0**	**0**	**66**	**109**	**0**	**175**	**100.0**
			0			**0**			**109**			**66**			**0**					

5. Net Gain/Loss in Employment

The difference between the projected total hiring and the projected total employment loss provides the net gain. Table 64 and Figure m present the net gain/loss for geoscientific consulting firms:

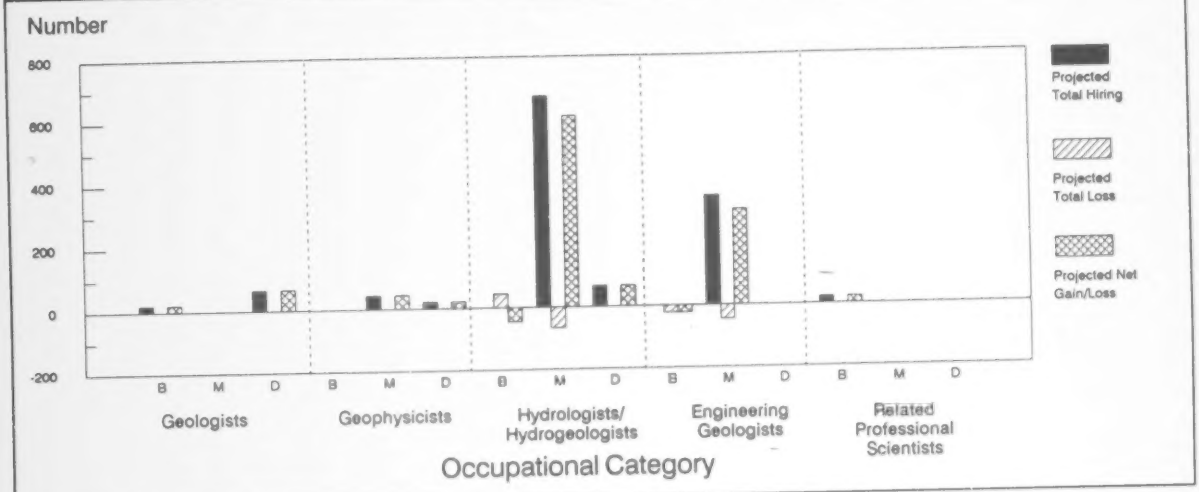
TABLE 64

Projected Net Gain/Loss in Employment
Geoscientific Consulting Firms

Occupational Category

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			TOTALS			
Occupational Objective	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**
Projected Total Hiring	22	0	66	0	44	22	0	674	66	0	347	0	22	0	0	44	1,065	154	1,263
Projected Total Loss	0	0	0	0	0	0	44	65	0	22	44	0	0	0	0	66	109	0	175
Projected Net Gain/Loss	**22**	**0**	**66**	**0**	**44**	**22**	**-44**	**609**	**66**	**-22**	**303**	**0**	**22**	**0**	**0**	**-22**	**956**	**154**	**1,088**

Figure m
Projected Net Gain/Loss in Employment
By Occupational Category and Degree Level
Geoscientific Consulting Firms



6. Approximate Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires by degree level are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$ 23,500
MA/MS	$ 27,500
PhD	$ 34,167

F. Academia

Appendix, Tables VI.A-F

1. Current Employment Levels

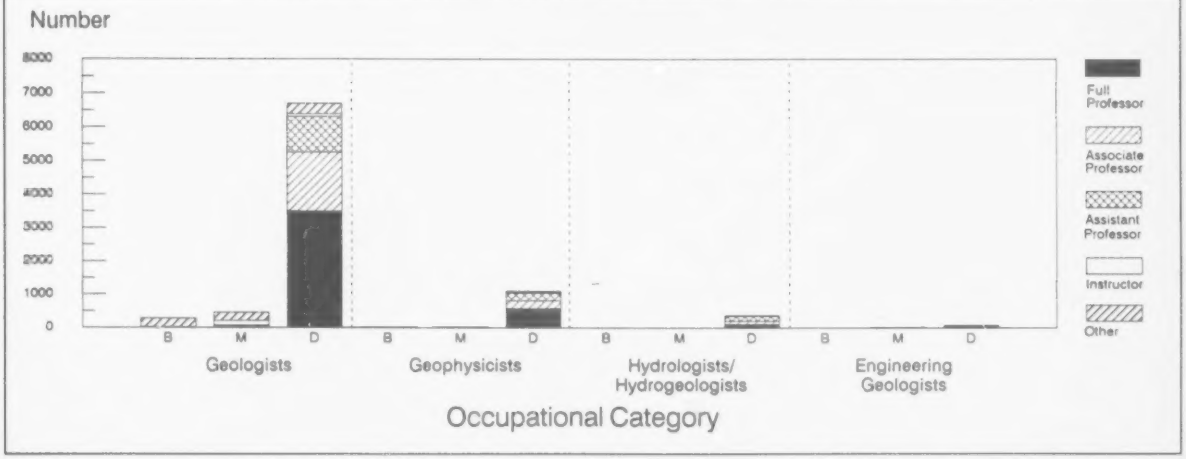
Sixty colleges and universities returned employment and hiring information. Table 65 and Figure n present current employment levels (as of 12/31/88) according to occupational level and occupational category, by degree level:

TABLE 65

Current Employment Level
by Occupational Level, Occupational Category, and Degree Level
Academia

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			TOTALS				
Occupational Level	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Full Professor	0	0	3,494	0	0	578	0	0	108	0	0	36	0	0	4,216	4,216	46.7
Associate Professor	0	36	1,759	0	0	253	0	0	108	0	0	24	0	36	2,144	2,180	24.2
Assistant Professor	0	36	1,048	0	12	217	0	0	133	0	12	24	0	60	1,422	1,482	16.4
Instructor	12	133	84	0	0	12	0	0	12	0	0	0	12	133	108	253	2.8
Other	265	241	301	24	12	36	0	0	12	0	0	0	289	253	349	891	9.9
Total	**277**	**446**	**6,686**	**24**	**24**	**1,096**	**0**	**0**	**373**	**0**	**12**	**84**	**301**	**482**	**8,239**	**9,022**	**100.0**
			7,409			1,144			373			96					

Figure n
Current Employment Levels
by Occupational Objective, Occupational Category and Degree Level
Academia



2. Number Hired in 1988

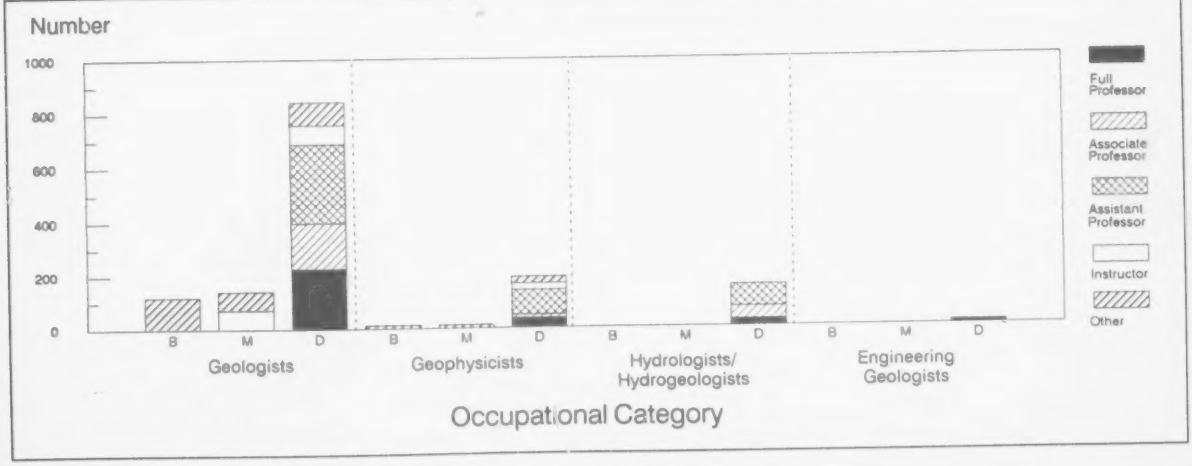
Colleges and universities provided the number of geoscientists actually hired in 1988, as shown in Table 66 and Figure o:

TABLE 66

Number of Geoscientists Actually Hired in 1988 by Occupational Level, Occupational Category, and Degree Level Academia

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			TOTALS				
Occupational Level	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Full Professor	0	0	229	0	0	36	0	0	24	0	0	12	0	0	301	301	20.2
Associate Professor	0	0	169	0	0	12	0	0	48	0	0	0	0	0	229	229	15.3
Assistant Professor	0	0	289	0	0	96	0	0	84	0	0	0	0	0	469	469	31.4
Instructor	0	72	72	0	0	24	0	0	0	0	0	0	0	72	96	168	11.3
Other	121	72	84	12	12	24	0	0	0	0	0	0	133	84	108	325	21.8
Total	**121**	**144**	**843**	**12**	**12**	**192**	**0**	**0**	**156**	**0**	**0**	**12**	**133**	**156**	**1,203**	**1,492**	**100.0**
			1,108			**216**			**156**			**12**					

Figure o
Number of Geoscientists Actually Hired in 1988 by Occupational Objective, Occupational Category, and Degree Level Academia



3. Projected Hiring for 1989

Colleges and universities provided the number of expected hires for 1989. Those estimates project the number of new hires (i.e., those to be hired directly from colleges/universities) and experienced hires. Table 67 shows projections for new hires, by occupational level, occupational category, and degree level:

TABLE 67

Projected New (Inexperienced) Hires for 1989
By Occupational Level, Occupational Category, and Degree Level
Academia

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			TOTALS				
Occupational Level	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Full Professor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Associate Professor	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	36	5.2
Assistant Professor	0	0	277	0	0	48	0	0	60	0	0	12	0	0	397	397	56.9
Instructor	0	24	12	0	0	0	0	0	12	0	0	0	0	24	24	48	6.9
Other	133	36	24	12	12	0	0	0	0	0	0	0	145	48	24	217	31.1
Total	**133**	**60**	**349**	**12**	**12**	**48**	**0**	**0**	**72**	**0**	**0**	**12**	**145**	**72**	**481**	**698**	**100.1**
			542			72			72			12					

Table 68 shows projected 1989 hiring for experienced geoscientists:

TABLE 68

Projected Experienced Hires for 1989
By Occupational Level, Occupational Category, and Degree Level
Academia

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			TOTALS				
Occupational Level	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Full Professor	0	0	48	0	0	24	0	0	0	0	0	0	0	0	72	72	20.6
Associate Professor	0	0	24	0	0	0	0	0	12	0	0	0	0	0	36	36	10.3
Assistant Professor	0	0	145	0	0	0	0	0	0	0	0	0	0	0	145	145	41.5
Instructor	12	12	24	0	0	0	0	0	0	0	0	0	12	12	24	48	13.8
Other	12	12	24	0	0	0	0	0	0	0	0	0	12	12	24	48	13.8
Total	**24**	**24**	**165**	**0**	**0**	**24**	**0**	**0**	**12**	**0**	**0**	**0**	**24**	**24**	**301**	**349**	**100.0**
			313			24			12			0					

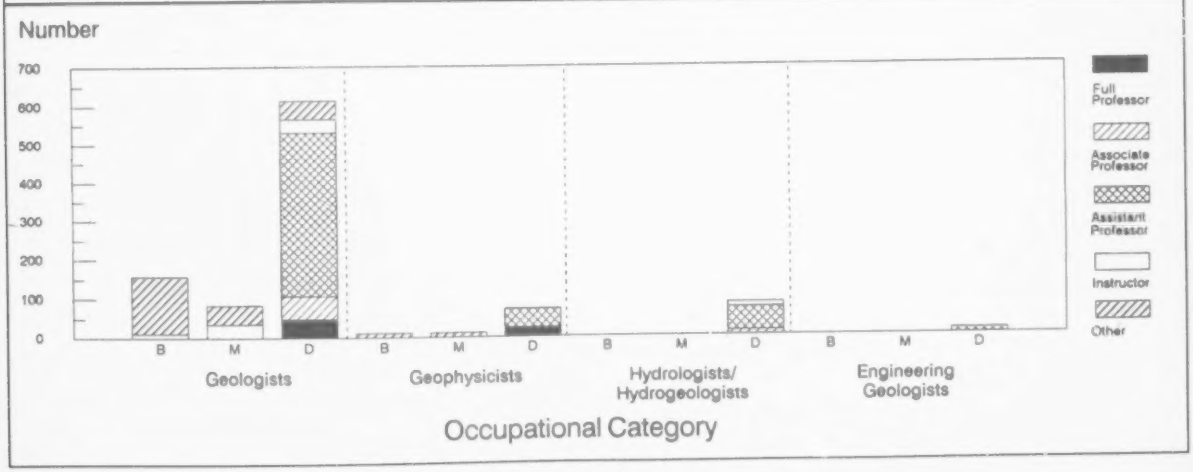
Table 69 and Figure p present the total projected hiring (inexperienced and experienced) for 1989 for academia:

TABLE 69

Projected New (Inexperienced) and Experienced Hires for 1989
By Occupational Level, Occupational Category, and Degree Level
Academia

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			TOTALS				
Occupational Level	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total	% of Total
Full Professor	0	0	48	0	0	24	0	0	0	0	0	0	0	0	72	72	6.9
Associate Professor	0	0	60	0	0	0	0	0	12	0	0	0	0	0	72	72	6.9
Assistant Professor	0	0	422	0	0	48	0	0	60	0	0	12	0	0	542	542	51.8
Instructor	12	36	36	0	0	0	0	0	12	0	0	0	12	36	48	96	9.2
Other	145	48	48	12	12	0	0	0	0	0	0	0	157	60	48	265	25.3
Total	157	84	614	12	12	72	0	0	84	0	0	12	169	96	782	1,047	100.1
			855			96			84			12					

Figure p
Projected Total Hires for 1989
by Occupational Objective, Occupational Category, and Degree Level
Academia



4. Projected Losses for 1989

Table 70 presents the number expected to be lost in 1989, due to resignations, retirements, and terminations:

TABLE 70

Projected Losses for 1989
By Occupational Category and Degree Level
Academia

	Occupational Category																
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			TOTALS				
Reason for Loss	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**B**	**M**	**D**	**Total**	**% of Total**
Resignations	0	0	24	0	0	0	0	0	0	0	0	0	0	0	24	24	7.7
Retirements	0	12	108	0	0	12	0	0	0	0	0	0	0	12	108	120	38.5
Terminations	48	36	60	0	0	12	0	0	12	0	0	0	48	36	84	168	53.8
Total	**48**	**48**	**192**	**0**	**0**	**24**	**0**	**0**	**12**	**0**	**0**	**0**	**48**	**48**	**216**	**312**	**100.0**
			288														

5. Net Gain/Loss in Employment

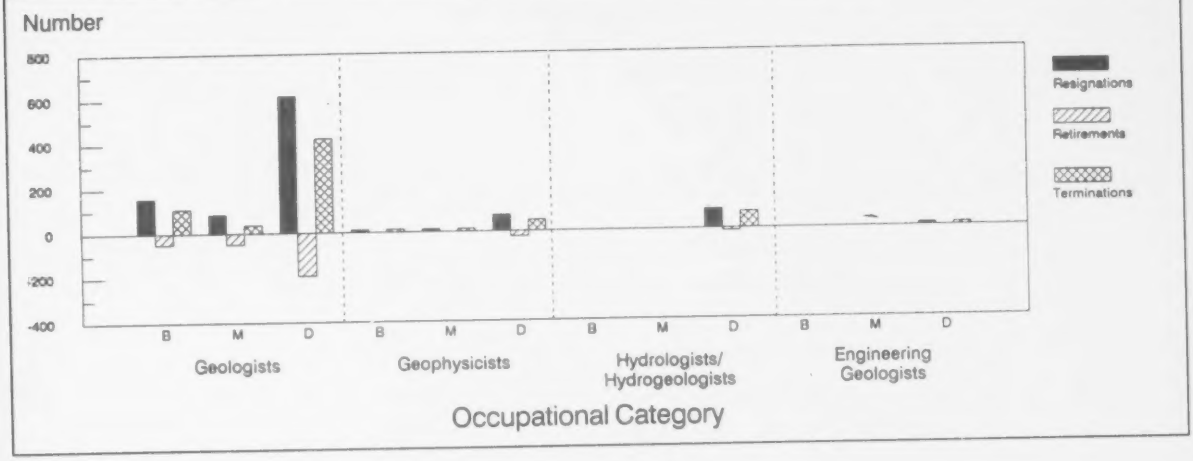
The difference between the projected total hiring and the projected total employment loss provides the net gain. Table 71 and Figure q present the net gain/loss for academia:

TABLE 71

Projected Net Gain/Loss in Employment
Academia

	Occupational Category															
	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			TOTALS			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Projected Total Hiring	157	84	614	12	12	72	0	0	84	0	0	12	169	96	782	1,047
Projected Total Loss	48	48	192	0	0	24	0	0	12	0	0	0	48	48	228	324
Projected Net Gain/Loss	**109**	**36**	**422**	**12**	**12**	**48**	**0**	**0**	**72**	**0**	**0**	**12**	**121**	**48**	**554**	**723**

Figure q
Projected Net Gain/Loss in Employment
by Occupational Category and Degree Level
Academia



6. Approximate Starting Salaries for Inexperienced New Hires

The approximate starting salaries for inexperienced new hires by degree level are as follows:

Degree Level	Approximate Starting Salary
BA/BS	$ 18,864
MA/MS	$ 20,517
PhD	$ 29,643

IV. Summary of Employment and Hiring Projections

A. Current Employment Levels

Table 72

Summary of Current Employment Levels by Occupational Category and Employer Category

Occupational Category	Employer Category: Oil/Gas Industry	Mining/ Minerals Industry	Federal/ State Govts	Research Insts/ DOE-funded Natl Labs	Geoscientific Consulting Firms	Academia	Total	% of Total
Geologists	23,110	9,923	4,882	1,114	2,067	7,409	48,505	58.2
Geophysicists	11,042	154	996	171	240	1,144	13,747	16.5
Hydrologists/Hydrogeologists	0	0	4,576	163	3,413	373	8,525	10.2
Engineering Geologists	0	385	0	113	2,174	96	2,768	3.3
Related Professional Scientists	4,412	462	3,528	1,251	153	0	9,806	11.8
TOTAL	**38,564**	**10,924**	**13,982**	**2,812**	**8,047**	**9,022**	**83,351**	**100.0**

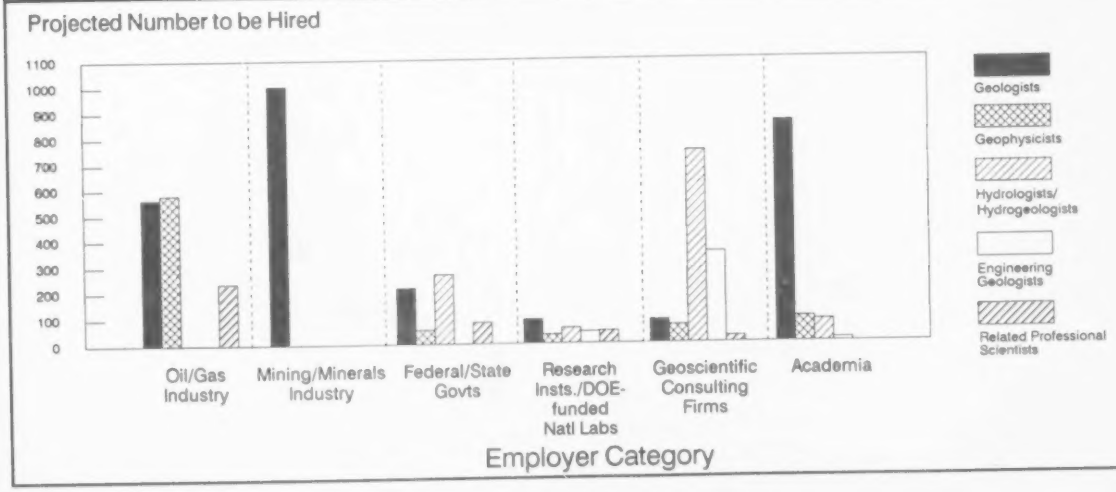
B. Projected Hiring

Table 73

Summary of Projected Hiring Levels for 1989 by Occupational Category and Employer Category

Occupational Category	Employer Category: Oil/Gas Industry	Mining/ Minerals Industry	Federal/ State Govts	Research Insts/ DOE-Funded National Labs	Geoscientific Consulting Firms	Academia	TOTAL	% of Total
Geologists	562	1,001	216	91	88	855	2,813	50.5
Geophysicists	579	0	53	32	66	96	826	14.8
Hydrologists/ Hydrogeologists	0	0	265	58	740	84	1,147	20.6
Engineering Geologists	0	0	0	43	347	12	402	7.2
Related Professional Scientists	235	0	81	45	22	0	383	6.9
TOTAL	(1,376)	(1,001)	(615)	(269)	(1,263)	(1,047)	(5,571)	(100.0)
	1,400	**1,000**	**600**	**250**	**1,250**	**1,050**	**5,550**	
% Increase over Current Employment	**3.6**	**9.1**	**4.3**	**8.3**	**15.6**	**11.7**	**6.6**	
% of Total Hiring	**25.2**	**18.0**	**10.8**	**4.5**	**22.5**	**18.9**	**99.9**	

Figure r
Summary of Projected Hiring Levels for 1989 by Occupational Category and Employer Category



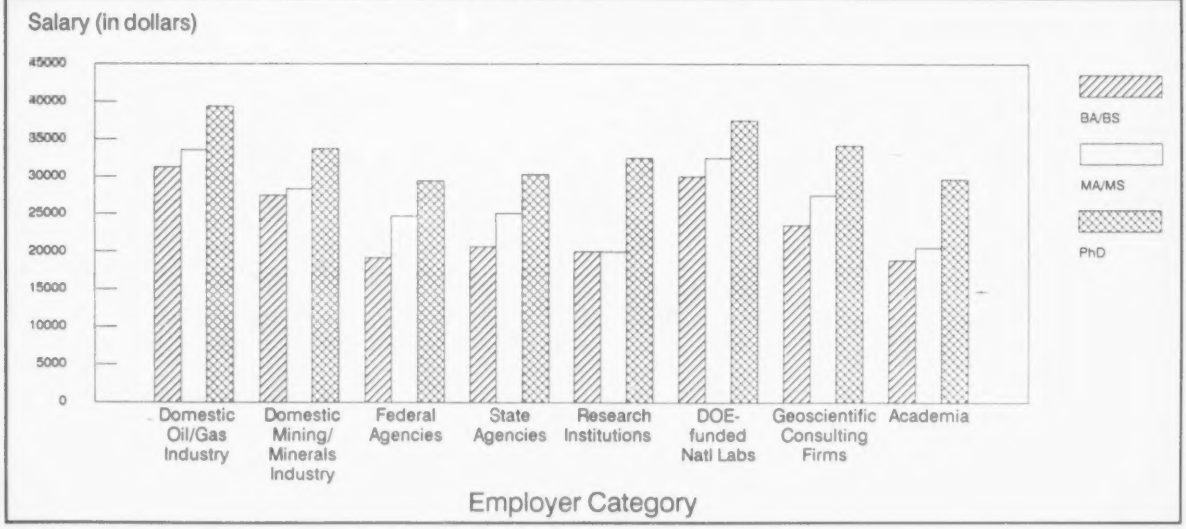
V. Summary of Starting Salaries

Table 74

Approximate Starting Salaries for Inexperienced New Hires by Employer Category and Degree Level

Employer Category	BA/BS	MA/MS	PhD
Domestic Oil and Gas Industry	$31,250	$33,571	$39,375
Domestic Mining and Minerals Industry	$27,500	$28,334	$33,750
Federal/State Government Agencies			
Federal Agency	$19,167	$24,643	$29,400
State Agency	$20,648	$25,000	$30,208
Research Institutions/ DOE-funded National Laboratories			
Research Institutions	$20,000	$20,000	$32,500
DOE-funded National Laboratories	$30,000	$32,500	$37,500
Geoscientific Consulting Firms	$23,500	$27,500	$34,167
Academia	$18,864	$20,527	$29,643

Figure s
Approximate Starting Salaries for Inexperienced New Hires by Employer Category and Degree Level



APPENDIX
Current Employment Levels and Hiring Projections for 1989

I. Domestic Oil and Gas Industry

Response rate: 42.9% (12 of 28 companies responded)

Table I.A

Current Employment Levels
Domestic Oil and Gas Industry
(Sample[1], as of 12/31/88)

	Geologists[2]			Geophysicists			Related Professional Scientists[3]			
	B	M	D	B	M	D	B	M	D	Total
Exploration	361	1122	159	307	483	51	57	41	3	2,584
Field Development & Production	214	534	39	62	93	13	28	1	0	984
Seismic Acquisition & Processing	0	3	1	55	39	4	17	5	1	125
E & P Research	31	81	154	31	64	107	86	56	143	753
Other	32	17	2	1	3	1	77	10	0	143
Total	**638**	**1757**	**355**	**456**	**682**	**176**	**265**	**113**	**147**	**4,589**
			2750			**1314**			**525**	

Table I.B

Number Actually Hired in 1988
Domestic Oil and Gas Industry
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	Total
Exploration	8	68	3	8	54	2	5	4	1	153
Field Development & Production	13	27	1	0	13	0	3	0	0	47
Seismic Acquisition & Processing	0	0	0	1	4	0	2	0	1	8
E & P Research	0	4	16	0	7	4	0	2	3	36
Other	1	0	0	0	0	0	0	0	0	1
Total	**12**	**99**	**20**	**9**	**78**	**6**	**10**	**6**	**5**	**245**
			131			**93**			**21**	

1 "Sample" refers to the actual (raw) data provided by employers.

2 Includes Geochemists.

3 e.g., Computer scientists processing geoscience data, chemists in geochemistry labs, etc.

Table I. C

Number of Inexperienced New Hires for 1989
Domestic Oil and Gas Industry
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	Total
Exploration	0	29	2	5	33	1	2	2	0	74
Field Development & Production	0	13	0	0	10	0	0	0	0	23
Seismic Acquisition & Processing	0	0	0	1	5	0	0	10	0	16
E & P Research	0	1	5	0	2	2	0	0	0	10
Other	0	0	0	0	0	0	0	0	0	0
Total	0	43	7	6	50	3	2	12	0	123
			50			59			14	

Table I.D

Number of Experienced Hires for 1989
Domestic Oil and Gas Industry
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	Total
Exploration	3	5	1	2	5	0	1	0	0	17
Field Development & Production	0	5	0	0	3	0	0	0	0	8
Seismic Acquisition & Processing	0	0	0	0	0	0	0	0	0	0
E & P Research	0	2	0	0	0	0	0	0	0	2
Other	0	1	0	0	0	0	7	6	0	14
Total	3	13	1	2	8	0	8	6	0	41
			17			10			14	

Table I.E

Number of Total Hires for 1989
Domestic Oil and Gas Industry
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	Total
Exploration	3	34	3	7	38	1	3	2	0	91
Field Development & Production	0	18	0	0	13	0	0	0	0	31
Seismic Acquisition & Processing	0	0	0	1	5	0	0	10	0	16
E & P Research	0	3	5	0	2	2	0	0	0	12
Other	0	1	0	0	0	0	7	6	0	14
Total	3	56	8	8	58	3	10	18	0	164
			67			69			28	

Table I.F

Net Gain/Loss in Employment
Domestic Oil and Gas Industry
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	Total
Total Hires	3	56	8	8	58	3	10	18	0	164
Total Loss	33	77	8	21	39	4	14	7	2	205
Net Gain/Loss	-30	-21	0	-13	19	-1	-4	11	-2	-41

II. Domestic Mining/Minerals Industry

Response rate: 29.6% (8 of 27 companies responded)

Table II.A

Current Employment Levels
Domestic Mining and Minerals Industry
(Sample, as of 12/31/88)

	Geologists			Geochemists			Geophysicists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Exploration	33	55	8	0	0	0	1	1	0	3	1	0	2	0	0	104
Operations	11	19	3	0	0	0	0	0	0	1	0	0	0	4	0	38
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**44**	**74**	**11**	**0**	**0**	**0**	**1**	**1**	**0**	**4**	**1**	**0**	**2**	**4**	**0**	**142**
			129			0			2			5			6	

Table II.B

Number Actually Hired in 1988
Domestic Mining and Minerals Industry
(Sample, as of 12/31/88)

	Geologists			Geochemists			Geophysicists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Exploration	4	11	3	0	0	0	0	0	0	0	1	0	0	0	0	19
Operations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**4**	**11**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**19**
			18			0			0			1			0	

Table II.C

Number of Inexperienced New Hires for 1989
Domestic Mining and Minerals Industry
(Sample, as of 12/31/88)

	Geologists			Geochemists			Geophysicists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Exploration	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Operations	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**2**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7**
			7			0			0			0			0	

Table II.D

Number of Experienced Hires for 1989
Domestic Mining and Minerals Industry
(Sample, as of 12/31/88)

	Geologists			Geochemists			Geophysicists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Exploration	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Operations	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	6
			6			0			0			0			0	

Table II.E

Number of Total Hires for 1989
Domestic Mining and Minerals Industry
(Sample, as of 12/31/88)

	Geologists			Geochemists			Geophysicists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Exploration	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Operations	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	10	0	0	0	0	0	0	0	0	0	0	0	0	0	13
			13													

Table II.F

Net Gain/Loss in Employment
Domestic Mining and Minerals Industry
(Sample, as of 12/31/88)

	Geologists			Geochemists			Geophysicists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
To Be Hired	3	10	0	0	0	0	0	0	0	0	0	0	0	0	0	13
To Be Lost	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	6
Net Gain/Loss	2	7	-2	0	0	0	0	0	0	0	0	0	0	0	0	7

III. Federal and State Government Agencies - Federal Government Agencies

Response Rate: 33.3% (7 of 21 agencies responded)

Table III.A

Current Employment Levels
Federal Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	334	290	648	84	129	163	1	36	163	103	89	70	2,110
Resource Evaluation	187	68	7	0	0	0	1,038	450	0	217	63	3	2,033
Regulatory	3	3	7	1	1	3	0	0	0	144	139	94	395
Other	3	1	87	9	6	23	119	100	37	253	179	122	939
Total	**527**	**362**	**749**	**94**	**136**	**189**	**1,158**	**586**	**200**	**717**	**470**	**289**	**5,477**
			1,638			419			1,944			1,476	

Table III.B

Number Actually Hired in 1988
Federal Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	0	25	9	0	12	5	0	5	10	2	2	2	72
Resource Evaluation	8	6	1	0	0	0	81	22	0	12	1	1	132
Regulatory	1	0	0	0	0	0	0	0	0	2	4	5	12
Other	0	0	0	0	0	0	0	0	0	3	2	0	5
Total	**9**	**31**	**10**	**0**	**12**	**5**	**81**	**27**	**10**	**19**	**9**	**8**	**221**
			50			17			118			36	

Table III.C

Number of Inexperienced New Hires for 1989
Federal Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	18	8	0	6	6	0	0	2	0	1	1	0	42
Resource Evaluation	3	6	1	0	0	0	5	6	0	4	1	0	26
Regulatory	0	0	0	0	0	0	0	2	0	0	2	0	4
Other	0	0	0	0	0	0	0	0	0	1	0	0	1
Total	**21**	**14**	**1**	**6**	**6**	**0**	**5**	**10**	**0**	**6**	**4**	**0**	**73**
			36			12			15			10	

Table III.D

Number of Experienced Hires for 1989
Federal Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	0	0	8	0	6	4	0	1	3	2	2	2	28
Resource Evaluation	4	4	1	0	0	0	50	32	0	2	1	1	95
Regulatory	0	0	0	0	0	0	1	1	0	2	2	0	6
Other	0	1	0	0	0	0	0	0	0	2	1	1	5
Total	4	5	9	0	6	4	51	34	3	8	6	4	134
			18			10			88			18	

Table III.E

Number of Total Hires for 1989
Federal Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	18	8	8	6	12	4	0	3	3	3	3	2	70
Resource Evaluation	7	10	2	0	0	0	55	38	0	6	2	1	121
Regulatory	0	0	0	0	0	0	1	3	0	2	4	0	10
Other	0	1	0	0	0	0	0	0	0	3	1	1	6
Total	25	19	10	6	12	4	56	44	3	14	10	4	207
			54			22			103			28	

Table III.F

Net Gain/Loss in Employment
Federal Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
To Be Hired	25	19	10	6	12	4	56	44	3	14	10	4	207
To Be Lost	9	20	22	2	4	8	52	22	0	22	11	7	179
Net Gain/Loss	16	-1	-12	4	8	-4	4	22	3	-8	-1	-3	28

State Government Agencies

Response rate: 62.0% (31 of 50 agencies responded)

Table III.G

Current Employment Levels
State Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	73	176	137	0	4	9	8	28	19	18	13	24	509
Resource Evaluation	29	72	15	2	4	0	4	6	1	2	3	1	139
Regulatory	17	14	5	0	0	0	0	1	0	1	0	0	38
Other	7	9	5	0	0	1	1	0	0	5	9	1	38
Total	126	271	162	2	8	10	13	35	20	26	25	26	724
			559			20			68			77	

Table III.H

Number Actually Hired in 1988
State Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	9	13	8	0	2	1	4	0	2	4	3	3	49
Resource Evaluation	3	5	2	1	0	0	1	1	0	0	1	0	14
Regulatory	18	1	1	0	0	0	0	1	0	1	0	0	22
Other	0	1	6	0	0	0	1	0	0	2	0	0	10
Total	30	20	17	1	2	1	6	2	2	7	4	3	95
			67			4			10			14	

Table III.I

Number of Inexperienced New Hires for 1989
State Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	4	6	4	0	0	0	0	1	1	1	1	1	19
Resource Evaluation	0	2	0	0	0	0	0	0	0	0	0	0	2
Regulatory	1	0	0	0	0	0	0	0	0	0	0	0	1
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5	8	4	0	0	0	0	1	1	1	1	1	22
			17			0			2			3	

Table III.J

Number of Experienced Hires for 1989
State Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	2	7	2	0	0	1	4	2	6	1	1	0	26
Resource Evaluation	2	4	1	0	0	0	0	1	0	0	1	0	9
Regulatory	3	0	1	0	0	0	0	0	0	1	0	0	5
Other	0	2	6	0	0	0	0	0	0	0	0	1	9
Total	7	13	10	0	0	1	4	3	6	2	2	1	49
			30			1			13			5	

Table III.K

Number of Total Hires for 1989
State Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	6	13	6	0	0	1	4	3	7	22	1	4	5
Resource Evaluation	2	6	1	0	0	0	0	1	0	0	10	1	1
Regulatory	4	0	1	0	0	0	0	0	0	1	0	0	6
Other	0	2	6	0	0	0	0	0	0	0	0	1	9
Total	12	21	14	0	0	1	4	4	7	3	3	2	71
			47			1			15			8	

Table III.L

Net Gain/Loss in Employment
State Government Agencies
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
To Be Hired	12	21	14	0	0	1	4	4	7	3	3	2	71
To Be Lost	4	17	3	0	0	0	2	3	0	0	1	1	31
Net Gain/Loss	8	4	11	0	0	1	2	1	7	3	2	1	40

IV. Research Institutions and DOE-funded National Laboratories - Research Institutions

Response Rate: 28.6% (6 of 21 institutions responded)

Table IV.A

Current Employment Levels
Research Institutions
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	11	7	47	0	0	4	0	0	0	0	0	0	11	4	2	86
Applied	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	16
Total	11	7	47	0	0	4	0	0	0	0	0	0	27	4	2	102
			65			4			0			0			33	

Table IV.B

Number Actually Hired in 1988
Research Institutions
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	5	0	4	0	0	0	0	0	0	0	0	0	2	1	0	12
Applied	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
Total	5	0	4	0	0	0	0	0	0	0	0	0	6	1	0	16
			9			0			0			0			7	

Table IV.C

Number of Inexperienced/Experienced Hires for 1989[1]
Research Institutions
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	1	1	3	0	0	0	0	0	0	0	0	0	1	1	0	7
Applied	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
Total	1	1	3	0	0	0	0	0	0	0	0	0	5	1	0	11
			5			0			0			0			6	

Table IV.D

Net Gain/Loss in Employment
Research Institutions
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
To be Hired	1	1	3	0	0	0	0	0	0	0	0	0	5	1	0	11
To be Lost	2	0	1	0	0	0	0	0	0	0	0	0	4	2	0	9
Net Gain/Loss	-1	1	2	0	0	0	0	0	0	0	0	0	1	-1	0	2

1 Because research institutions indicated that they would not be hiring any experienced personnel, Table C represents the total number to be hired in 1989.

Research Institutions and DOE-funded National Laboratories -

DOE-funded National Laboratories

Response Rate: 71.4% (5 of 7 laboratories responded)

Table IV.E

Current Employment Levels
DOE-funded National Laboratories
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	7	15	52	1	2	7	0	0	4	1	0	3	31	33	94	250
Applied	2	18	51	0	3	14	1	9	16	1	12	4	6	15	22	174
Other	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
Total	9	33	104	1	5	22	1	9	16	2	12	7	37	48	116	426
			146			28			26			21			201	

Table IV.F

Number Actually Hired in 1988
DOE-funded National Laboratories
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	0	0	1	0	0	1	0	0	1	0	0	0	3	2	4	12
Applied	0	1	4	0	2	1	0	2	1	0	2	0	1	1	2	17
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	5	0	2	2	0	2	2	0	2	0	4	3	6	29
			6			4			4			2			13	

Table IV.G

Number of Inexperienced New Hires for 1989
DOE-funded National Laboratories
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	0	0	2	0	0	2	0	0	1	0	0	0	0	0	0	5
Applied	0	0	4	0	0	2	0	3	3	0	3	1	1	1	0	18
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	6	0	0	4	0	3	4	0	3	1	1	1	0	23
			6			4			7			4			2	

Table IV.H

Number of Experienced Hires for 1989
DOE-funded National Laboratories
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	3
Applied	0	2	2	0	0	1	0	1	3	0	2	2	0	0	1	14
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	2	4	0	0	2	0	1	3	0	2	2	0	0	1	17
			6			2			4			4			1	

Table IV.I

Number of Total Hires for 1989
DOE-funded National Laboratories
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Research	0	0	4	0	0	3	0	0	1	0	0	0	0	0	0	8
Applied	0	2	6	0	0	3	0	4	6	0	5	3	1	1	1	32
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	2	10	0	0	6	0	4	7	0	5	3	1	1	1	40
			12			6			11			8			3	

Table IV.J

Net Gain/Loss in Employment
DOE-funded National Laboratories
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
To be Hired	0	2	10	0	0	6	0	4	7	0	5	3	1	1	1	40
To be Lost	0	2	4	0	0	2	0	2	1	0	3	0	1	2	2	19
Net Gain/Loss	0	0	6	0	0	4	0	2	6	0	2	3	0	-1	-1	21

V. Geoscientific Consulting Firms

Response Rate: 10.9% (6 of 55 consulting firms responded)

Table V.A

Current Employment Levels
Geoscientific Consulting Firms
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Oil & Gas	14	5	2	0	1	1	0	0	0	0	0	0	3	2	1	29
Minerals	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	4
Environmental	25	8	39	0	3	4	48	95	14	16	81	3	1	0	0	337
Total	39	15	41	0	6	5	48	95	14	16	81	3	4	2	1	370
			95			11			157			100			7	

Table V.B

Number Actually Hired in 1988
Geoscientific Consulting Firms
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Oil & Gas	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Minerals	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	3
Environmental	0	1	2	0	0	0	3	17	0	2	9	0	0	0	0	34
Total	5	3	2	0	1	0	3	17	0	2	9	0	2	0	0	44
			10			1			20			11			2	

Table V.C

Number of Inexperienced New Hires for 1989
Geoscientific Consulting Firms
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Oil & Gas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minerals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Environmental	0	0	2	0	1	1	0	21	2	0	10	0	0	0	0	37
Total	0	0	2	0	1	1	0	21	2	0	10	0	0	0	0	37
			2			2			23			10				

Table V.D

Number of Experienced Hires for 1989
Geoscientific Consulting Firms
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Other Related Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Oil & Gas	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Minerals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Environmental	0	0	1	0	1	0	0	10	1	0	6	0	1	0	0	20
Total	**1**	**0**	**1**	**0**	**1**	**0**	**0**	**10**	**1**	**0**	**6**	**0**	**1**	**0**	**0**	**21**
			2			1			11			6			1	

Table V.E

Number of Total Hires for 1989
Geoscientific Consulting Firms
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Oil & Gas	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Minerals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Environmental	0	0	3	0	2	2	0	31	3	0	16	0	1	0	0	58
Total	**1**	**0**	**3**	**0**	**2**	**2**	**0**	**31**	**3**	**0**	**16**	**0**	**1**	**0**	**0**	**59**
			4			4			34			16			1	

Table V.F

Net Gain/Loss in Employment
Geoscientific Consulting Firms
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			Related Professional Scientists			
	B	M	D	B	M	D	B	M	D	B	M	D	B	M	D	Total
Total Hires	1	0	3	0	2	2	0	31	3	0	16	0	1	0	0	59
Total Loss	0	0	0	0	0	0	2	3	0	1	2	0	0	0	0	8
Net Gain/Loss	1	0	3	0	2	2	-2	28	3	-1	14	0	1	0	0	51

VI. Domestic Academic Institutions

Response Rate: 55.6% (60 of 108 colleges/universities responded)

Table VI.A

Current Employment Levels
Academia
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Full Professor	0	0	290	0	0	48	0	0	9	0	0	3	350
Associate Professor	0	3	146	0	0	21	0	0	9	0	0	2	181
Assistant Professor	0	3	87	1	18	0	0	0	1	1	1	2	123
Instructor	1	11	7	0	0	1	0	0	1	0	0	0	21
Other	22	20	25	2	1	3	0	0	1	0	0	0	74
Total	**23**	**37**	**555**	**2**	**2**	**91**	**0**	**0**	**31**	**0**	**1**	**7**	**749**
			615			95			31			8	

Table VI.B

Number Actually Hired in 1988
Academia
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Full Professor	0	0	19	0	0	3	0	0	2	0	0	1	25
Associate Professor	0	0	14	0	0	1	0	0	4	0	0	0	19
Assistant Professor	0	0	24	0	0	8	0	0	0	0	0	7	39
Instructor	0	6	6	0	0	2	0	0	0	0	0	0	14
Other	10	6	7	1	1	2	0	0	0	0	0	0	27
Total	**10**	**12**	**70**	**1**	**1**	**16**	**0**	**0**	**13**	**0**	**0**	**1**	**124**
			92			18			13			1	

Table VI.C

Number of Inexperienced New Hires for 1989
Academia
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Full Professor	0	0	0	0	0	0	0	0	0	0	0	0	0
Associate Professor	0	0	3	0	0	0	0	0	0	0	0	0	3
Assistant Professor	0	0	23	0	0	4	0	0	5	0	0	1	33
Instructor	0	2	1	0	0	0	0	0	1	0	0	0	4
Other	11	3	2	1	1	0	0	0	0	0	0	0	18
Total	**11**	**5**	**29**	**1**	**1**	**4**	**0**	**0**	**6**	**0**	**0**	**1**	**58**
			45			**6**			**6**			**1**	

Table VI.D

Number of Experienced Hires for 1989
Academia
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Full Professor	0	0	4	0	0	2	0	0	0	0	0	0	6
Associate Professor	0	0	2	0	0	0	0	0	1	0	0	0	3
Assistant Professor	0	0	12	0	0	0	0	0	0	0	0	0	12
Instructor	1	1	2	0	0	0	0	0	0	0	0	0	4
Other	1	1	2	0	0	0	0	0	0	0	0	0	4
Total	**2**	**2**	**22**	**0**	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**0**	**29**
			26			**2**			**1**			**0**	

Table VI.E

Number of Total Hires for 1989
Academia
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
Full Professor	0	0	4	0	0	2	0	0	0	0	0	0	6
Associate Professor	0	0	5	0	0	0	0	0	1	0	0	0	6
Assistant Professor	0	0	35	0	0	4	0	0	5	0	0	1	45
Instructor	1	3	3	0	0	0	0	0	1	0	0	0	8
Other	12	4	4	1	1	0	0	0	0	0	0	0	22
Total	**13**	**7**	**51**	**1**	**1**	**6**	**0**	**0**	**7**	**0**	**0**	**1**	**87**
			71			**8**			**7**			**1**	

Table VI.F

Net Gain/Loss in Employment
Academia
(Sample, as of 12/31/88)

	Geologists			Geophysicists			Hydrologists/ Hydrogeologists			Engineering Geologists			
	B	M	D	B	M	D	B	M	D	B	M	D	Total
To Be Hired	13	7	51	1	1	6	0	0	7	0	0	1	87
To Be Lost	4	4	16	0	0	2	0	0	1	0	0	0	27
Net Gain/Loss	9	3	35	1	1	4	0	0	6	0	0	1	60

Table VII.A

Summary of Current Employment Levels and Hiring Projections for 1989

	Domestic Oil & Gas Industry	Domestic Mining & Minerals Industry	Federal & State Government Agencies		Research Institutions & DOE-funded Nat'l Labs		Geoscientific Consulting Firms	Academia	TOTAL
Number Employed	4,859	142	6,211		566		370	749	12,627
Number in Geoscience Population	38,500	11,000	14,000		3,000		8,000	9,000	83,500
% of Population Reported	11.9	1.3	44.4		18.9		4.6	8.3	15.1
Campus Hiring	1,050	550	F 150		R 50		800	700	3,450
			S 50		D 100				
			200		150				
Experienced Hiring	350	450	F 300		R 0		450	350	2,100
			S 100		D 100				
			400		100				
Total Projected Hiring	1,400	1,000	600		250		1,250	1,050	5,550
% of Total Hiring	25.2	18.0	10.8		4.5		22.5	18.9	99.9
% Increase over Current Levels	3.6	9.1	4.3		8.3		15.6	11.7	6.6
Number to be Lost	1,700	450	F 400		R 50		200	300	3,250
			S 50		D 100				
			450		150				
Net Gain	-300	550	150		100		1,050	750	2,300
% of Total Gain	-13.0	23.9	6.5		4.4		45.6	32.6	100.0
% Increase over Current Levels	-0.8	5.0	1.1		3.3		13.1	8.3	2.8

(All projections rounded to the nearest 50)

F = Federal Government Agencies
S = State Government Agencies
R = Research Institutions
D = DOE-funded National Laboratories

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